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ORIGINAL ARTICLES

THE MOYNIHAN TRADITION[1]

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SENIOR SURGEON TO MIDDLESEX HOSPITAL; TEMPORARY SURGEON REAR-ADMIRAL

IT is appropriate that here in Leeds, close to the General Infirmary with its wealth of surgical tradition dating a hundred years before the birth of its greatest son, I should say something of the distinguished founder of this lectureship, trying to recall, if only for a short space of time, this great surgical shade before the eyes of those who knew him, and endeavouring on behalf of those of immature years to invest a great legendary name with some panoply of his vital attributes—his transcendental surgical skill, his superb literary gifts, his oratorical powers and personal magnetism.

This lectureship was founded by the first Lord Moynihan in memory of his mother, Ellen Anne Moynihan, who was indeed responsible for his final reluctant decision to abandon an army career and devote himself to surgery. He came of a military family; his father, Andrew Moynihan, at the storming of the Redan in the Crimean War had gained one of the earliest Victoria Crosses and had subsequently received a commission from the ranks—a rare distinction a century ago. It is said that no fewer than five Moynihans fell at the battle of Malplaquet in 1709, and his own paternal grandfather, Malachi Moynihan, had also been a soldier. His name bespoke his Irish descent, for his paternal forbears hailed from Templemore in Tipperary. The proud possession in the Moynihan family of a V.C. ensured for the gallant father a permanent niche in the temple of fame, and Moynihan himself religiously observed the anniversary of this *dies dierum* on which the Victoria Cross had been won.

It is idle to speculate upon the reasons which determined him to found this lectureship in his mother's memory, but it is incumbent on me to refer to his affection for her; he would have wished this. The courage of his mother in her widowhood doubtless appealed to Moynihan, but it was probably the realisation, not bruited from the housetop, that he owed everything to her that determined him to commemorate her name in this lecture.

The following letter, written in 1929 to the present and second Lord Moynihan, reveals the depths of his affection for her:

"The greatest regret I have is that you could not know my mother, the most beautiful, kindest, most lovable mother in the world. You would have loved each other and you would have learned much from her. She was the gentlest, sweetest, most considerate of people. I never heard her say an uncharitable thing of anyone; she never did an unkind act; and at immense sacrifice she gave me my chance. She was terribly poor, and my education was more than she could afford; but she denied herself everything for me. And she showered love on me and helped me so gently and tenderly in every possible way. It was her influence that made me want to work and to succeed for my son, as she had laboured and sacrificed for me, so you see, my son, it is to her that I owe everything."

* * *

Berkeley Moynihan was born in Malta on Oct. 2, 1865. His schooling was uneventful and at his kindergarten and at Christ's Hospital he achieved nothing of note. His athletic interests were first kindled at the Royal Naval School, then at New Cross, and he acquired some schoolboy repute in swimming and in football. But his undergraduate days in the medical school of Yorkshire College, Leeds, were spent in hard work; poverty permitted no indulgence in pleasures; the years of studentship were crowned with academic success, and prizes in nearly every subject except surgery rewarded his industry. His subsequent rise to surgical fame and the brilliance of his career are well known to all surgeons in Great Britain. He has been indubitably the greatest surgical figure of the first half of the twentieth century, and the name of Moynihan and the Moynihan tradition constitute a surgical asset—a possession for all time, not merely for Leeds; not only of the surgery of Britain, but of the whole British Empire.

In these days of vigorous traumatic surgery the gentleness which Moynihan displayed and taught, and for which his name stands, may possibly be forgotten or relegated to the background. Doubtless there will remain surgeons, when peace comes, who are still outraged at the spectacle of forcible retraction in the upper zone of the abdomen. The self-retaining retractor may be a useful expedient, or even an essential, for certain operations on the less vulnerable, less remonstrative, region of the pelvis; in the upper abdomen a self-retaining retractor is anathema to operators trained in a school of surgical gentleness. Moynihan was never tired of impressing upon surgical pilgrims and pupils that "every pull is a pain," and the grunt of the anæsthetised patient when, by some automatic contrivance, the edges of a wound in the upper abdomen are suddenly forced apart, betokens the truth of his teaching. The cunning of his fingers and the gentle but firm pressure of the appropriately placed hand of a skilful assistant enabled him to dispense with any contrivance or movement which savoured of vigour. He scorned brute force and himself attained that ideal in surgery of which he often spoke, "the heart of a lion and the hand of a lady." He rarely employed a needle-holder; his natural dexterity enabled him to suture freehand those deep-seated organs which others are wont to repair by means of a mounted or mechanical needle. He did not try to emulate Bland-Sutton whose few instruments were contained in a small case that could be easily carried on the little finger of one hand; he employed the special instrument for its particular purpose. He knew "every trick of the tool's true play," and although I am informed by those who have a mechanical turn of mind that the Moynihan ⅝-circle needle is ill-designed, involving three separate movements in the insertion of each suture, nevertheless it was a beautiful tool in his hands and is still employed by many of his disciples. Some of his skill in the free-hand use of the needle he had learned from his former chief, Mayo Robson, whose house-surgeon, junior colleague and collaborator he was in the formative years of his surgical career.

He was the first surgeon in this country to use rubber gloves in his operations; Mikulicz had employed cotton gloves in Germany, and Halsted who introduced rubber gloves in the Johns Hopkins Hospital presented Moynihan with six pairs. His sterilised white cap, coat and trousers and his clean white shoes earned for him in his early days the sobriquet of the "pyloric pierrot." He employed blood-transfusion before the last war in patients who had lost blood or as a pre-operative measure in the anæmic. He brought home with him from America the Elsberg direct-transfusion cannula and was the first to employ blood-transfusion in this country. The original apparatus which he and Braithwaite used is preserved among his collection of instruments in the museum of the medical school at Leeds. He had the same respect for a drop of blood as Halsted, and exercised the most punctilious care over hæmostasis. Someone in his theatre was once heard to remark: "Is English blood then so precious?"

He was fortunate in his complete self-confidence and was even ready to operate upon those related to him, for he thought himself the most capable of all to surmount any unforeseen complication which might present itself during the performance of the operation. This supreme assurance never deserted him in the operating theatre. Nevertheless, as Leonard Braithwaite has written, he was never completely satisfied with any operation he performed, always thinking he might have done something better, ever striving after an ideal which no man could attain. He possessed sublime surgical courage, and this he exhibited in every branch of surgery which he

1. Extracts from the first Moynihan Memorial lecture given at the University of Leeds in the presence of the Princess Royal on Oct. 2, on the 75th anniversary of the birth of Lord Moynihan. The lecture will be published in full later.

essayed. He was the first British surgeon to excise an aneurysm of the subclavian artery successfully, to perform a total gastrectomy successfully and to operate upon a chronic duodenal ulcer (1900), the first to remove a pancreatic calculus successfully, and the first to deal surgically with anastomotic ulceration following gastro-jejunostomy. He shared with Sampson Handley the credit of the first operations for arterial embolectomy. According to Braithwaite "he often said that an operation was a religious rite. . . . In the operating theatre he was very stern and silent—no sound must be heard during the administration of the anæsthetic, and during the operation all must speak if at all in whispers—the gravest incident did not make him raise his voice or hurry his activity."

At times, however, he would assume a histrionic mien and, at the commencement of an operation for prostatic removal, would close his eyes and reverently murmur "In memory of Arthur Fergusson McGill, nephew and godson of Sir William Fergusson." He may have wished to acquaint visitors with the historic information that McGill was the first to remove a prostate transvesically and it certainly gave him an opportunity of adding that he had acted as assistant to McGill on the occasion of that pioneer operation in March, 1887.

Moynihan's published orations and addresses give him a right to a place among the most gifted medical writers of all time. His books were finished products of literary art. He excelled as a letter writer not only by reason of the charming things he would put in a letter, but in the delightful phraseology and his precise, beautiful handwriting. He had also every attribute to make his spoken word effective; his handsome face, charming voice, seeming self-assurance and obvious pleasure in his rôle all contributed to his success on the platform. His talents as a speaker were doubtless not unconnected with his Irish ancestry, but he took as much pains in the preparation of a speech as he did in helping a patient through the ordeal of an operation. To each task he gave his utmost. Apart from prepared discourse he was alert and apt in debate, powerful in committee and quick at repartee.

* * *

The success of the *British Journal of Surgery* and its pre-eminent position in surgical periodical literature are inseparably linked with the names of Hey Groves and Moynihan. Of Moynihan, as chairman of the editorial committee, Hey Groves has written "he brought to the work not only his consummate skill and tact, but his peculiar and at that time unique knowledge of the surgeons and surgical work of his country." He sagaciously suggested, for instance, that a representative on the editorial committee should be secured from every teaching school in Great Britain and Ireland, and also from amongst surgeons in India and the Dominions. Hey Groves is happily still at the helm after 27 years' service and Moynihan presided over the monthly editorial meetings until the time of his death.

He realised the value of surgical comradeship and of surgical travel and was able to inculcate his beliefs and aspirations into others. In July, 1909, he sent out a circular letter to a number of prominent provincial surgeons to discuss forming a surgical club. The club was born on the 23rd of that month, but was not christened until October, 1911, when it assumed the title of the "Chirurgical Club." When it had almost come of age, its name was changed to the "Moynihan Club."

The idea of an association of surgeons of Great Britain and Ireland had long captured Moynihan's imagination, and his dream was realised in 1920, when its first meeting was held in London under the presidency of Sir John Bland-Sutton. The object of the association was not only the discussion of scientific papers but the encouragement of friendships between British surgeons. This was one of his most valuable gifts to British surgery; thenceforth surgeons became "a band of brothers" and were no longer a crowd of jostling competitors. The men elected were those possessed of the highest surgical ideals. Membership is large, yet limited, and competition is still keen to be elected to its ranks. No more honourable body exists in the world today than the British Association of Surgeons.

This large body, however, did not provide the intimacies associated with smaller groups bound together by common surgical interest, close ties of friendship, or the bond of service to their country in war. Various travelling surgical societies of limited membership have sprung into being since the last war; not only has the Moynihan Club been the prototype of these foundlings, but Moynihan himself was invariably consulted about their inception and to his clinic each invariably made its first pilgrimage.

Moynihan was proud of his country and his country's mission in the world's politics. His international surgical reputation, his exceptional oratorical and literary talents and his personality all combined to make him a popular envoy wherever he travelled. From an early period in his surgical career he had cultivated the friendship of American surgeons and was in the habit of crossing the Atlantic at least once a year. The friendships which he made in the United States and Canada were cemented by return visits of surgeons to Moynihan's clinic who were attracted by his surgery and overwhelmed by his generous hospitality. His American addresses on England's war effort in the last great conflagration did much to convince our brethren across the Atlantic of the honourable ideals for which we were fighting and to persuade them to join the crusade for freedom. In his enthusiasm for American surgery he stimulated British surgeons, especially the younger ones, to make pilgrimages to the chief transatlantic clinics. Fresh friendships were forged between the countries and links between American and British surgery have been welded the stronger.

He was actively interested in the founding of the American College of Surgeons and was largely responsible for the dignified gesture of friendship made in the presentation of a mace for the newly formed College. It was the gift of the British consultant surgeons of the last war to their erstwhile comrades-in-arms, and Moynihan presented it at Montreal in 1920. He delivered his famous Murphy oration on the same day.

Teutonic surgical practice impressed Moynihan little. Visits to the German Reich evoked this remark: "The German always manages to do a simple thing in a difficult or cumbersome way." His visit to Latin-America had something of a political significance. European countries recognised the international character of the work of this arresting surgical personality and he was honoured in France and Belgium, in Serbia, Poland and Lombardy, and across the Mediterranean in Egypt.

* * *

Any estimate of Moynihan would arouse well-merited criticism if it were to present him solely in the dubious light of a panegyric. In the last few years faults and flaws appeared in this great surgical figure whom all had admired and many adored. During this eventide of his life he still occupied the surgical Woolsack as President of the Royal College of Surgeons of England and took his seat in the House of Lords as the first Baron Moynihan of Leeds, but these were no longer the years of wondrous surgical endeavour and achievement, and his operating theatre was no longer the Mecca for surgeons from all over the world. Degenerative changes stealthily taking place in his cerebral vessels, to which his death was ultimately due, caricatured and exaggerated the streak of vanity which had always been part of his make-up. Herein lies the real explanation of his latter-day faults and foibles; although his superb surgical craftsmanship never deserted him, unexpected attitudes of mind, unreasonable demands and faulty judgment occasionally revealed to his professional friends that processes of ingravescent decay had laid their hand upon this great surgical master.

In surgery and medicine the external badges of so-called leadership are not seldom merely the reward of service, and may betoken few of those attributes which have been noted by philosophers and historians as characterising the leaders of mankind. There have been great master surgeons, but few who merit the title of leader; Moynihan belonged to this select group. His beautiful craftsmanship made worshippers of all who saw him in his operating theatre; his words could convince, persuade, even mesmerise; he inspired his assistants and juniors with his own ideals and stimulated them to work for the advancement of surgery. On his death England offered him a place in the Valhalla of our country's heroes and leaders. This was an honour

which, if we leave aside the transference of John Hunter's bones from St. Martin's-in-the-Fields to the Abbey, had only been offered to Lord Lister before him: Hunter—Lister—Moynihan. But he was buried in the environs of Leeds, where he had laboured for half a century. In his own words, "memorials are of many kinds: some are graven in stone, some are cast in bronze, some are written in letters of gold upon the roll of honour which enshrines the names of the saviours of their country. There is yet another memorial; it is borne in the hearts of those from whom a heavy load of suffering has been lifted, and from whom the cold hand of death has been turned aside." There is even another; it abides in the work and the ideals of those to whom was granted the happy privilege of association with the Master Surgeon, and of those who are permitted to carry on the torch which he fired and which blazed so brightly in his hands.

THE REALITY OF PARTIAL DEFICIENCIES *

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THE argument that "because beri-beri is unknown in England therefore everyone must be having enough vitamin B_1" is false. There is a wide gap between the *minimum* diet (the amount needed to prevent well-defined clinical symptoms of deficiency) and the *optimum* (the amount needed to promote fullest health). Thus subnormal nutrition may be present even when there are no obvious physico-clinical signs.

EXAMPLES OF PARTIAL DEFICIENCIES

One of the best examples is the subclinical nutritional anæmia, so common among working-class infants and mothers. It is generally detected only by chemical test but is associated none the less with increased morbidity although not necessarily with any obvious clinical manifestation (H. Mackay). Again, it has been proved repeatedly that children show a better performance—weight, height, physique, skin, hair, nails, naughtiness, &c.—when extra supplements are included in their diet although their previous diets and clinical appearances were considered to be up to the "average," and therefore mis-named "normal." (References include: Corry Mann; the "Oslo experiment" in Scandinavia; milk in schools; and most recently the striking results of the Oslo breakfasts under the L.C.C.). Numerous tests both on animals and on humans illustrate the beneficial effect of increasing the intakes from the bare minimum to the optimum. For example, vitamin A has improved the dark-adaptation in various carefully controlled tests on apparently normal schoolboys; vitamin B_1 has improved the growth-rates and gastrointestinal function in young children. Likewise in the rat: half a unit of vitamin B_1 may be enough to keep the animal alive and prevent symptoms of beri-beri but not to allow a normal gain in weight, one unit will permit only bare maintenance without active growth, two units moderate growth, four units still better performance and so on, up to (according to Waterman and Ammerman, see figure) even thirty units or beyond. The dose-response curve gradually flattens out; but it is hard to know when sufficient vitamin B_1 has been given so that a further doubling of the dose does not still produce some detectable slight improvement.

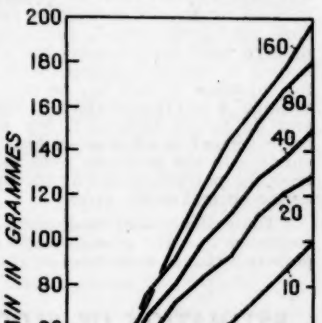
Vitamin C is no exception to the general rule, differentiating minima from optima. To deal first with the experimental animal, 0·5–1 mg. of ascorbic acid daily will prevent a guineapig getting recognisable "clinical" signs of scurvy. But if we pursue our inquiries a little further and make a microscopic examination of tooth structure we find that a considerably larger dose is needed for normal functioning of the formative cells. Administration of the bare scurvy-preventing dose will not prevent almost total degeneration of odontoblasts after two weeks. Likewise much more than the "minimal" dose is needed to confer maximal protection against infection. Szent-Györgyi has rightly ridiculed the idea of subdividing all mankind into two categories, (*a*) "Scurvy" and (*b*) "No scurvy," and supposing that the latter is synonymous with enough vitamin C for optimal health. In the human, as Göthlin and others since have shown, the consumption of the "minimal" dose of vitamin C needed to prevent actual scurvy is far short of the amount needed to prevent lowered capillary fragility. The increased susceptibility to infection on diets low in vitamin C is equally well authenticated, and a majority if not all workers correlate this with a lowered complement titre. Explorers have defined "irritability and uncalled for argumentativeness" as among the pre-scorbutic symptoms; pædiatricians have long been aware of sallowness and other prodromal signs in infancy.

Similarly, suboptimal intakes of vitamin D produce subclinical rickets—lowered assimilation of calcium and phosphate, minor bony defects, increased incidence of dental caries, and probably impaired muscular tone.

INCIDENCE OF UNDERNUTRITION †

Investigators have collected information about the occurrence of undernutrition in this country along several different channels, as follows. A few typical examples are cited under each heading.

Presence of disorders of nutrition.— Three examples are: (1) the occurrence of nutritional anæmia in 70% of bottle-fed infants, and in 40% of breast-fed infants in a poor part of London, or in 50% of poor-class women in Aberdeen; (2) the continued occurrence of rickets †; and (3) the high proportion of school-children in poorer districts found partially deficient in vitamins A and C by dark-adaptation and saturation tests.



Growth curves of rats receiving varying allowances of vitamin B_1 (after Waterman and Ammerman, *J. Nutrit.* 1935, **10**, 42). The rats were first depleted on a vitamin-B_1-free diet; then the supplements of the vitamin were given intermittently every fifth day. The figures on the curves show the intakes calculated on a daily basis, in microgrammes (3 microgrammes = 1 I.U.).

Results of experimental feeding.—Many examples could be cited and perhaps the best known is that of Corry Mann who showed that, in a residential school, children given extra milk had an average yearly gain of 6·98 lb. in weight and 2·63 in. in height, whereas children in the same school who did not have extra milk gained only 3·85 lb. in weight and 1·84 in. in height. Numerous recent experiences with supplementary milk amply confirm these findings.

Comparisons of different social groups.—Returns from the school medical officers for the varying grades of malnutrition are many times higher in certain poor districts than in well-to-do districts. Again, malnutrition is an important factor in infant mortality, the rate of which is twice as high in poor districts as in wealthy areas. In Newcastle-on-Tyne, according to some returns, the measles mortality-rate was three times as high in the poor districts, and the morbidity-rate eight times as high for bronchitis and pneumonia. It is certain that differences in nutrition is *one* of the principal factors responsible.

In addition to the foregoing, it has been possible to make estimates of a more indirect kind of the probable incidence of undernutrition in given areas, once certain justifiable assumptions have been made about the cheapest cost of an adequate diet or about the smallest

* Abstract of a paper prepared for the Dundee and Reading meetings of the British Association 1939, 1940 (cf. also *Brit. med. J.* 1939, **1**, suppl. 305).

† For a more comprehensive treatise on the incidence and assessment of malnutrition see *Medical Officer* 1937, **58**, 225, 237, 249, 261 and 273. In the present abbreviated version some of the phrasing follows that of a recent article in *The Practitioner*, 1940, **145**, 105.

amounts of various types of foodstuffs considered necessary for health.

Deficient dietary intakes.—The average consumption of milk in this country is only a small fraction of the optimum of one to two pints daily, or of that which is consumed in other countries where standards of physique and health are higher.

Deficient financial resources.—It is generally agreed that upward of 25% of the population are unable to afford the cost of an optimal diet (in 1936 Orr gave the figure as 50%). Before the war the minimum cost of an "optimum diet" was approximately 10*s.* per adult or 5*s.* per child per week, and it is common knowledge that large portions of the population are unable to attain this figure. "It is not until we reach the group with a family income of about £1 per head per week—i.e., £4 for man and wife and two children—that the diet, according to modern standards, is adequate for health" (Orr 1936).

Unfortunately, as is now being generally recognised, the assessment of the state of nutrition by the routine school medical service is liable to yield incomplete or misleading results. A cursory inspection of a child is not sufficient to reveal the existence of minor or partial degrees of dietary deficiency, and there is neither the time nor the specialised equipment to carry out the more modern tests for assessing the levels of nutrition, with respect to specific nutrients, such as the saturation tests for vitamins C and B_1, or the dysadaptation test for vitamin A mentioned above. The child can be weighed and its height measured, but records of the steady improvement in average weights and heights of school-children in the past few years show how fallacious has been the practice of taking the average for a given area as the normal or the ideal.

"The evidence that inadequacy of diet is widespread is conclusive . . . the greatest single cause of malnutrition is poverty" (L.o.N. Committee on Nutrition).

ESTIMATION OF BLOOD-VOLUME IN PLASMA TRANSFUSION

BY

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"It is now generally accepted that the most important single requirement for arresting the progressive deterioration in general condition, which is such a feature of shock, is restoration of blood-volume and thereby of tissue metabolism." This sentence is italicised in the M.R.C. memorandum on the treatment of wound shock.[1] Restoration of blood-volume can be gauged by clinical improvement and especially by improvement in blood-pressure and pulse-rate during the course of transfusion, but any simple method which would enable some estimate of blood loss to be made would be an additional valuable guide as to the sufficiency of the transfusion. Provided blood-volume can be estimated, blood loss can be deduced by assuming a normal adult blood-volume of 5–6 litres according to physique. Under present conditions of warfare, with air-raid casualties many of which reach hospital within a short time of wounding, quite accurate estimates of blood loss can be made, because the patients are seen before compensating absorption of tissue fluids into the circulation has advanced sufficiently to have much effect on the figure to which the blood-volume had been reduced by the hæmorrhage.

Most methods for estimating blood-volume demand a complex technique, a troublesome collection of many large specimens of blood, and are therefore hardly suitable for application to exsanguinated and shocked patients whose collapsed vascular system is difficult to fill evenly with the essential dye solution and whose circulation is not improved by waiting the necessary 10, 15 or 20 minutes while the test samples of 15–30 c.cm. of blood are being extracted from collapsed veins.

On the other hand, a number of simple observations that can be carried out during the course of a plasma-transfusion afford a great opportunity for estimating blood-volume in selected cases of hæmorrhagic shock.

When a known volume of plasma is added to an unknown volume of blood the total volume of red cells in circulation is unaffected (assuming that hæmorrhage has ceased); the red cells can therefore act as an indicator of the amount of dilution brought about by the transfusion. Provided that the observations on the unaffected red cells are carried out immediately before and immediately after the rapid transfusion of a known volume of plasma a simple calculation will determine the original blood-volume of the transfused subject.

Suppose that a patient with an unknown blood-volume V has a hæmatocrit and cell-content of x% before transfusion, and after transfusion of P c.cm. of plasma his hæmatocrit reading is y%; what is the relation of V (unknown) to P, x and y, all of which are known? The answer is given by simple inverse proportion. $V : V + P :: y : x$ in which V is the only unknown quantity. But to those who desire a more detailed approach:

V = the original total blood-volume, and $\frac{Vx}{100}$ = the total cell-volume in terms of this blood-volume.

$V + P$ = the new total blood-volume, and $\frac{(V + P)y}{100}$ = the total cell-volume in terms of this new blood-volume.

But because the total cell-volume is unaltered by the addition of plasma

$$\frac{Vx}{100} = \frac{(V + P)y}{100} \qquad Vx = Vy + Py$$

$$V = \frac{Py}{x-y} = \frac{\text{volume transfused} \times \text{new hæmatocrit reading}}{\text{difference between hæmatocrit readings before and after transfusion}}$$

Example.—The hæmatocrit packed cell readings before and after transfusion of 1000 c.cm. of plasma are 44 mm. and 34 mm. respectively. Applying the above formula the original blood-volume is

$$\frac{1000 \times 34}{10} = 3400 \text{ c.cm.}$$

This calculation makes use of hæmatocrit values, but any other red-cell properties (all of which are unaltered in total by plasma-transfusion) may be used in the same manner—e.g., a hæmoglobin estimation or red-cell count obtained by a mere finger prick. These simple bedside methods give excellent scope for the approximate calculation of blood loss, and so for research into what is believed to be the fundamental pathology of shock.

The main fallacy of all methods for the estimation of blood-volume in exsanguinated subjects is that hæmorrhage is continuing while the test substance is being injected. Ideally hæmorrhage should always have ceased. Taking the example given above, a person with a blood-volume of 3400 c.cm. who is transfused with 1000 c.cm. of plasma, and who during the transfusion loses as much as 500 c.cm. of blood, would, with an original hæmatocrit reading of 44, be found at the end to have a calculated blood-volume of 3000 c.cm. Even this error does not place the method outside the bounds of practical utility.

The method has the advantage also that the circulation is progressively improved by the injection of relatively large volumes of protein fluid and this reduces the errors due to uneven dispersion and circulatory stagnation. Indeed, observations made after the transfusion of two or three pints of plasma tend on this account to be more accurate than those made after the transfusion of a single pint. Furthermore, plasma itself, in a case of simple hæmorrhage, does not rapidly leave the circulation, and, perhaps most important, the patient is not awaiting treatment during the period of observation.

The precautions that need to be observed are the same as with dye methods—the plasma must be transfused quickly during the period of observation. A pint in ten

1. M.R.C. War Memorandum, No. 1, 1940. H.M. Stationery Office.

minutes gives an opportunity for a primary observation while other amounts following equally quickly provide ample and even more reliable data for confirmatory deductions. The principle of this method, making use of plasma, was previously used in certain animal experiments by Scholander.[2]

SUMMARY

When a known volume of plasma is rapidly transfused the patient's blood-volume can simply be calculated from the hæmatocrit readings, hæmoglobin estimations or red-cell counts immediately before and after the transfusion.

A GALACTOSE-TOLERANCE TEST IN EXPERIMENTAL LIVER NECROSIS

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Various modifications of the galactose-tolerance test are used clinically. The usual practice is to administer the galactose by mouth and to estimate the total quantity excreted in the urine during a standard time; in other tests the amount of galactose in the blood is estimated. These oral galactose tests are complicated by the variability of the rate of absorption of the sugar from the intestine (see the succeeding paper by King and Aitken). We here record experiments with rabbits in which the liver was damaged experimentally and the subsequent impairment of liver function was tested by the rate of disappearance of galactose from the blood after injection of a standard amount. Carbon tetrachloride was used as a liver poison because this compound has been shown by Cameron (1936, 1937) to produce a suitable degree of liver damage. The method we have adopted is similar to that used by Poulson (1933) in studying hepatic dysfunction in rabbits whose livers had been rendered necrotic by poisoning with shale oil. Poulson estimated the total blood-sugar (glucose plus galactose). In the present experiments a differential method of sugar analysis is used which makes it possible to estimate the actual galactose present. A few experiments are included in which galactose was given by mouth, to show the variable level to which the blood galactose may rise with this method of administration.

TABLE I—ADMINISTRATION OF CARBON TETRACHLORIDE

Rabbit	Dosage	Doses (at 3-day intervals)	Total dosage (c.cm./kg.)	Survival	Rabbit	Dosage	Doses (at 3-day intervals)	Total dosage (c.cm./kg.)	Survival
28	0·4	1	0·4	4 days	53	0·1	2	0·2	1 week
29	0·4	1	0·4	2 ,,	69	0·1	2	0·2	5 days
30	0·4	1	0·4	few hours	70	0·1	2	0·2	6 ,,
33	0·1	8	0·8	survived	54	0·2	2	0·4	6 ,,
34	0·1	2	0·2	1 week	59	0·2	4	0·8	2 weeks
35	0·1	2	0·2	1 ,,	66	0·2	5	1·0	survived
52	0·1	4	0·4	2 weeks					(killed)

EXPERIMENTAL METHOD

Liver damage with carbon tetrachloride.—The carbon tetrachloride was dissolved in mineral oil to give a 20% solution; 5 c.cm. of this solution injected intraperitoneally in rabbits weighing 2·5 kg. (= 0·4 c.cm. of carbon tetrachloride per kg. body-weight) was fatal in a few hours or days. The same or even larger amounts administered in small spaced doses (0·1 c.cm. or 0·2 c.cm. of carbon tetrachloride per kg. of body-weight) produced a less acute degree of liver damage which the animals were able to survive for one to two weeks. Two animals were resistant to the liver poison and were later killed (table I). Liver necrosis developed in all these animals. The detailed histological reports are shown in the table.

Rabbit 28.—Necrosis followed by complete disappearance of liver cells from the central quarter of each lobule, where only a network of Kupffer cells remains, enclosing spaces partly empty and partly filled with erythrocytes. Damaged area is sharply defined and abuts on apparently healthy liver cells.

Rabbit 29.—Uniform necrosis of liver cells, affecting all but the outermost few cells of each lobule. A few relatively healthy cells immediately round the portal tracts, and next to these a few living cells showing severe fatty change. Remaining liver cells of each lobule necrotic; Kupffer cells have survived to a greater extent than liver cells, though many appear swollen.

Rabbit 30.—Section intensely engorged with blood; sinusoids distended. Liver cells show uniform fatty change in the form of fine droplets; many pyknotic; some, particularly towards centre of lobules, undergoing necrosis.

Rabbit 34.—Whole liver necrotic except for portal tracts. Surviving tissue only found in bile-ducts, arteries, veins, and connective tissue in portal tracts. Kupffer cells necrotic.

Rabbit 35.—A few surviving liver cells round the portal tracts; scattered odd cells show severe fatty change but are still apparently surviving. Remaining liver cells completely necrotic, though most appear to have undergone fatty change first. Kupffer cells have survived better than liver cells.

Rabbit 52.—Change appears to be midzonal necrosis. Cells appear relatively healthy at periphery of lobule. About midway to centre of lobule a zone of necrosis from which many liver cells have disappeared; a few necrotic remnants of liver cells made out; in the centre of lobule liver cells present but shrunken and sometimes fatty.

Rabbit 53.—Complete necrosis of all liver tissue, with only portal tracts surviving (exactly similar to rabbit 34).

TABLE II—BLOOD GALACTOSE OF NORMAL RABBITS AFTER ADMINISTRATION BY STOMACH-TUBE OF 1 G. GALACTOSE PER BODY-WEIGHT

Rabbit	Blood galactose (mg. per 100 c.cm.)				
	½ hr.	1 hr.	1½ hr.	2 hrs.	3 hrs.
308	2	6	5	5	4
309	4	7	13	18	—
311	18	34	40	35	—
312	19	9	10	6	6
313	—	56	43	43	8
314	—	9	22	29	23

Rabbit 54.—Midzone necrosis similar to rabbit 52. Zone of necrosis is wider and involves rather more than a third of each lobule.

Rabbit 59.—Necrosis of central cells of each lobule, similar to that seen in rabbit 28; necrosis less strictly localised but of about equal severity.

Rabbit 66.—Some disappearance of liver cells from centre of lobules, though very little necrosis or degeneration seen. Amount of liver tissue destroyed does not appear great. Early but definite cirrhosis.

Rabbit 69.—A few relatively healthy cells at periphery of lobules; remainder show fatty change and in many cases pyknosis or complete disappearance of nucleus. A few cells at centre of lobules have completely disappeared; Kupffer cells appear unaffected.

Rabbit 70.—Widespread necrosis of midzone so severe as to leave only a few surviving cells at either end of lobule.

LIVER-FUNCTION TESTS

Phosphatase was determined in a few cases by the King and Armstrong (1934) phenyl phosphate method.

Galactose-tolerance tests.—The excretion of galactose in the urine and the estimation of galactose in the blood (table II) after oral administration gave too variable results to make these methods satisfactory tests of hepatic function. A test in which the galactose was injected parenterally and the blood galactose followed was investigated. The details are given below.

Method of estimation of galactose.—The reducing capacity of a Somogyi (1931) copper tungstate deproteinised

2. Scholander, P. F. *Skand. Arch. Physiol.* 1938, **78**, 189.

filtrate of unlaked blood gives a measure of the true sugar content (King, Haslewood, and Delory 1937); it is equal to the difference between the reducing values before and after fermentation of the sugar in the blood with washed yeast. Bakers' yeast does not destroy galactose in solution when they are incubated together, whereas glucose is completely removed in a few minutes. It is therefore possible to estimate galactose in the presence of glucose by first removing the glucose with bakers' yeast and then determining the remaining sugar (galactose) by one of the reduction methods. This principle furnishes a simple method of determining galactose in the blood after the sugar has been administered.

Galactose solution for injection.—To keep the volume of injected fluid small, galactose has been used in concentrated solution—50% w./v.; 50 g. of galactose is placed in a 100 c.cm. volumetric flask (or 500 g. in a 1-litre flask), and water is added nearly to the mark. The mixture is placed on a hot-water bath and is shaken till solution is complete, water being added as the solid dissolves. The solution is allowed to cool to room temperature, the volume is adjusted to 100 c.cm., and the solution is well mixed. It is then passed through a Buchner filter, placed in small bottles with rubber caps in 10 c.cm. and 60 c.cm. quantities, and "steamed." The bottles are stored at room temperature: crystallisation may take place if the solution is chilled.

Administration of galactose.—Intraperitoneal injection of 10 c.cm. of a 50% solution of galactose into normal rabbits led to rising curves of blood galactose which reached their peaks (150–180 mg.) only after two hours and were still high (about 100 mg.) at three hours. The response to a smaller amount (1 g.—i.e., 2 c.cm. of solution—per kg.) showed a tendency to reach the maximal blood-galactose value at one hour and to return to about the resting level at the end of three hours. But although elevated curves were obtained with animals poisoned with carbon tetrachloride (see fig. 1) and this form of the test appeared suitable for animal experiments, the intraperitoneal injection of galactose was not pursued further, because it is not an ideal mode of administration for man.

TABLE III—BLOOD GALACTOSE OF NORMAL RABBITS AFTER INTRAVENOUS ADMINISTRATION OF 1 G. GALACTOSE PER KG. BODY-WEIGHT

Rabbit	Date	Blood galactose (mg. per 100 c.cm.) 5 min.	1 hr.	2 hrs.	3 hrs.	Rabbit	Date	Blood galactose (mg. per 100 c.cm.) 5 min.	1 hr.	2 hrs.	3 hrs.
308	March 24	162	47	28	5	311	March 24	183	47	11	0
	April 23	205	66	30	8		April 23	208	41	14	2
	May 2	225	55	28	2		May 3	252	62	22	6
	,, 9	251	49	15	0		,, 10	—	52	23	2
	June 8	247	56	15	1		,, 22	226	55	10	0
	,, 15	—	68	12	1						
	,, 22	—	62	20	2	312	April 12	207	58	23	1
	July 27	—	68	42	4		,, 24	237	68	17	2
							May 3	220	52	34	7
309	March 24	157	50	5	0		,, 9	—	40	21	4
	April 23	163	41	18	6		,, 10	—	54	30	0
	May 2	214	62	28	4						
	,, 9	224	35	23	0	313	April 12	217	69	19	0
	June 8	206	39	32	3		,, 24	264	64	20	2
	,, 18	—	60	18	0		May 3	154	44	21	2
	,, 22	—	85	50	12		,, 9	197	50	29	2
							,, 16	180	40	13	0
310	March 24	186	50	35	21						
	April 23	201	61	32	2	314	April 12	192	70	27	0
	May 2	270	66	27	3		,, 24	181	60	23	0
	,, 9	203	61	16	2		May 9	196	42	18	1
	June 15	—	60	15	1		June 8	210	63	26	1
	,, 23	—	77	32	3		,, 15	—	38	6	0
	,, 27	—	60	46	17		,, 22	—	58	21	20
							,, 27	—	83	42	3

Intravenous administration gave easily reproducible curves; 1 g. of galactose per kg. of body-weight was injected into the marginal vein of the rabbit's ear. The first sample of blood was taken five minutes later from the other ear, and succeeding samples at one, two, and three hours. In all normal animals in which this procedure was tried the galactose had disappeared, or nearly disappeared, from the blood by the end of three hours. The five-minute samples usually showed levels of 200–250 mg. per 100 c.cm.; the galactose fell rapidly during the first hour to about 60 mg. and more gradually during the second and third hours (see table III). In later work a sample was taken at one and a half hours instead of those at one and two hours.

Galactose-tolerance tests were carried out on normal rabbits and on rabbits poisoned with carbon tetrachloride. Galactose was injected intraperitoneally in rabbits 28, 29, and 30. The results are shown in fig. 1. The composite normal curve is the average of several tests. The disturbance of hepatic function consequent on the liver poisoning is seen both in the shape of the galactose curves and in the raised values of serum phosphatase.

Intravenous galactose-tolerance tests were conducted on 10 normal rabbits which subsequently received a series of injections of carbon tetrachloride. In fig. 2 is given a set of curves to illustrate the response. A composite curve shows the average response obtained in the untreated animals. Tests performed after the administration of carbon tetrachloride had begun are shown in the other curves. Usually the disappearance of galactose from the blood is considerably slower; the level being higher at one and a half hours and at the end of the three-hour test period. The damaged livers of these animals are supposedly unable to metabolise the administered galactose and to remove it from the blood as fast as do normal livers. The individual responses for the several rabbits, together with their weights before treatment and at death, are given in table IV.

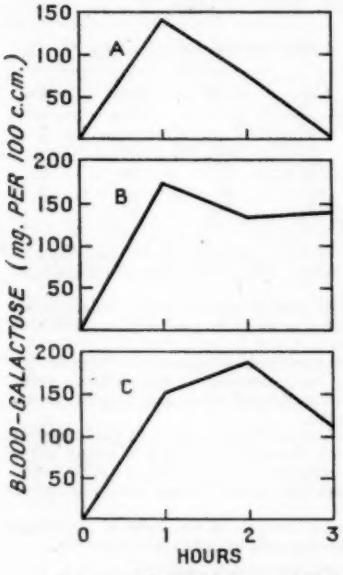

FIG. 1—Galactose-tolerance tests before and after liver damage due to carbon tetrachloride: A, composite curve for 3 normal rabbits (serum phosphatase 8, 10, and 10 units); B, rabbit 28 one day after administration of carbon tetrachloride (serum phosphate 17 units, 35 units on second day); C, rabbit 29 one day after administration of carbon tetrachloride (serum phosphatase 16 units, 27 units on second day).

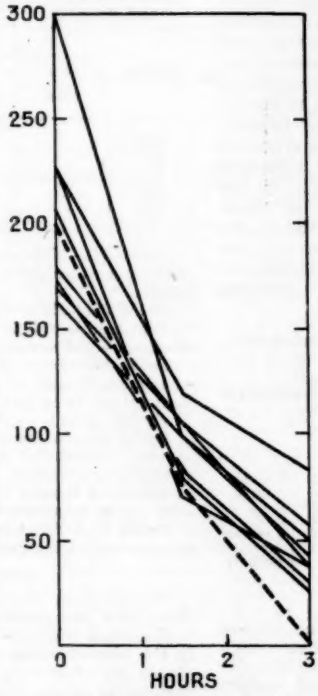

FIG. 2—Intravenous galactose-tolerance tests: interrupted line, average response of 10 normal rabbits; continuous lines, responses of individual animals after liver poisoning due to carbon tetrachloride.

SUMMARY

Liver necrosis has been produced in rabbits by the administration of carbon

TABLE IV—INTRAVENOUS GALACTOSE-TOLERANCE TESTS

Rabbit	Before carbontetrachloride and after treatment started	Blood galactose (mg. per 100 c.cm.) 5 min.	1½ hr.	3 hrs.	Weight (g.) Before treatment	At death
33	Before	112	79	22	2420	2060
	4 days after	225	118	82		
34	Before	163	51	0	2520	2200
	3 days after	163	98	40		
35	Before	214	106	3	2450	2500
	3 days after	206	78	26		
52	Before	201	81	0	2680	2420
	3 days after	170	104	56		
	10 days after	203	70	29		
53	Before	181	72	19	2650	2470
	4 days after	180	106	38		
54	Before	210	52	10	2570	2450
	5 days after	174	81	29		
59	Before	252	64	10	2420	1600
	4 days after	165	94	48		
	13 days after	210	58	48		
66	Before	154	66	8	2920	1580
	13 days after	226	72	38		
	23 days after	304	98	49		
69	Before (Not done after)	217	72	2	3350	3180
70	Before (Not done after)	243	83	10	2070	1835

tetrachloride, and several modifications of the galactose-tolerance test of hepatic function have been studied. A procedure is described in which the galactose is administered intravenously and the rate at which galactose disappears from the blood is determined. This has been found to be a convenient and reliable means of testing liver dysfunction.

We are indebted to Prof. G. R. Cameron for advice on the dosage of carbon tetrachloride.

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AN INTRAVENOUS GALACTOSE-TOLERANCE TEST

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THE galactose-tolerance test, introduced by Bauer in 1906, is widely used clinically in attempting to differentiate between toxic and obstructive jaundice. As most commonly employed, the test consists in the oral administration of 40 g. of galactose, followed by analysis of the urine passed in the succeeding five hours to determine the total amount of galactose excreted. If the liver (and to a lesser extent, other tissues) has metabolised the administered galactose to such an extent that less than 3 g. is excreted in the five hours following ingestion, its functional capacity is held to be unimpaired. The excretion of more than 3 g. of galactose is considered to indicate subnormal hepatic function. This procedure is admittedly only a rough test of liver function, but it is simple and easily performed and has been held by Shay et al. (1931, 1937) to give results which fit the clinical and post-mortem findings in most cases. Piersol and Rothman (1928) considered it to have little value.

The rise in the total blood-sugar following oral administration of galactose has been studied by several workers, including Kahler and Machold (1922), Harding and van Nostrand (1929), Beaumont and Dodds (1931), and von Uexküll (1939). Two objections to this method of conducting the test have been raised: the rise in blood-sugar is not entirely due to galactose, some extra glucose being present in the blood after the administration of galactose; and the rate of absorption of galactose from the intestine may be sufficiently variable to make difficult the interpretation of the blood-sugar curves.

The first objection may be overcome by determining the blood galactose rather than the total blood-sugar. Fortunately there is a simple means of accomplishing this differentiation; it is possible quantitatively to remove glucose from blood by the fermentative action of yeast without destroying any of the galactose. Raymond and Blanco used this principle in 1928; Grant and Glaister described a satisfactory procedure for estimating galactose in the blood in 1933. Although blood-galactose determinations have been made, after oral administration, as a test of liver function in several laboratories, few publications on the subject have appeared. Harding and Grant (1933) showed the variable level to which galactose might rise in the bloodstream after ingestion of a standard amount. Althausen, Lockhart, and Soley (1940) used this form of galactose-tolerance test in the study of thyroid disease; and MacLagan (1940) described its satisfactory application to cases of jaundice and of hyperthyroidism.

The rate of absorption of galactose is greater than that of any other sugar in the rat (Cori 1925). This widely quoted finding has led to the belief that galactose is an ideal substance for use in tolerance tests. But its rate of absorption in man is certainly variable and, in our experience, after 40 g. has been taken by mouth the blood galactose may be anything from a few milligrammes to 60 mg. per 100 c.cm. This great variation in the peak of the blood-galactose curve suggested that a more satisfactory procedure would be to give the sugar intravenously to ensure flooding of the system with galactose in all subjects at the beginning of the test. The rate at which galactose disappeared from the blood should then furnish some measure of the glycogenic function of the liver, which is the principal tissue concerned with its conversion into glycogen.

Intravenous galactose-tolerance tests have been employed on the continent for some years (Pollak 1932, Budak 1933). In these tests a relatively small dose of galactose (8–10 g. in a 40% solution) was administered and the total blood-sugar estimated at short intervals for ½ to 1 hour. Experiments have been made on animals with artificially produced liver damage (see preceding paper, King, Harrison, and Delory, this issue); in these, attempts were made to test the hepatic function by plotting blood-galactose curves, after the intravenous injection of large amounts of the sugar. This work led to a study of liver-function tests at the Hammersmith Hospital, and an intravenous galactose test has been developed for application to man. The technique finally adopted is very like that of Jankelson and Lerner (1934; Jankelson, Segal and Aisner 1936), and similar results have been obtained.

EXPERIMENTAL PROCEDURE

A solution of galactose (50 g. per 100 c.cm. of solution) is prepared and sterilised by filtration and steaming (see preceding paper).

Graded doses of galactose.—The patient receives no breakfast. An amount of solution equivalent to 0·5 g. of galactose per kg. of body-weight—e.g., 60 c.cm. of the 50% solution for a 60 kg. person—is injected intravenously from a 100 c.cm. syringe, the injection being given slowly over about five minutes.

Standard dose of galactose.—The injection of 50 c.cm. of a 50% solution of galactose has given with adults results indistinguishable from those obtained with

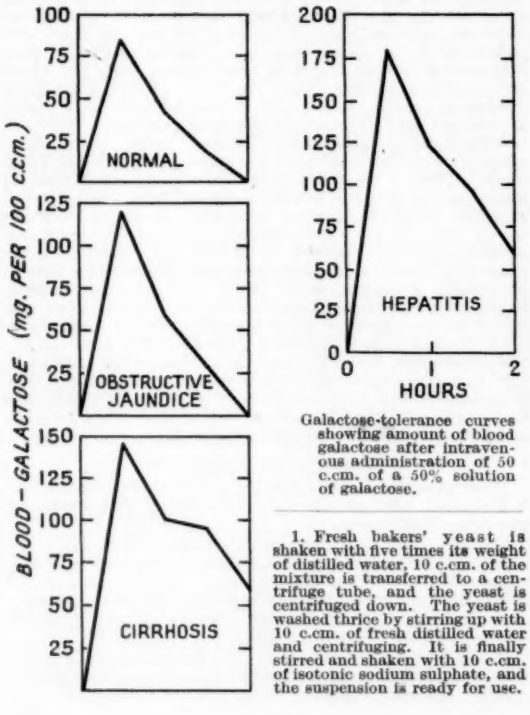
graded doses. This is a much more convenient amount to inject, because most hospital wards have 50 c.cm. syringes, whereas 100 c.cm. syringes are usually special equipment. Tables I and II give results for the graded and standard doses in normal and non-hepatic cases. Tests carried out by both procedures in cases of jaundice gave results so similar that the graded dose was eventually abandoned in favour of the standard injection of 50 c.cm.

Samples of blood.—The first sample of blood is taken immediately after the administration of the galactose (5 minute sample), the second sample at ½ hour, and further samples at 1, 1½, and 2 hours. In later work a sample taken before the galactose administration has been substituted for that at 5 minutes. This resting sample is a useful check on the analytic method because it should contain no galactose.

Analysis.—The samples of blood (0·2 c.cm. of capillary blood) are washed into centrifuge tubes containing 2·2 c.cm. of isotonic sodium sulphate; 1 c.cm. of yeast suspension is added.[1] The contents of the tube are thoroughly mixed and are kept at 37° C. for 15 minutes. This treatment completely removes the glucose. Then 0·3 c.cm. each of a 10% solution of sodium tungstate and of a 7% solution of copper sulphate is added, and the mixture is gently shaken. The precipitated proteins and yeast are centrifuged or filtered, and 2 c.cm. of the filtrate (equivalent to 0·1 c.cm. of blood) is used for the estimation of the sugar. If the Harding copper method described by King, Haslewood, and Delory (1937) is employed, the factor 162 is used for conversion of the titration figure (cubic centimetres of 0·005 N thiosulphate) into milligrammes of galactose per 100 c.cm. of blood. The procedure is fully described in a forthcoming paper (King, Haslewood, Delory and Beall 1940).

RESULTS

The galactose values are plotted against time and for a normal person usually give a curve which begins about 200 mg. of galactose per 100 c.cm. of blood, falls steeply during the first hour, and reaches a figure between 0 and 10 mg. per 100 c.cm. at the end of two hours. In most cases of obstructive jaundice the curve of blood galactose follows the same course, there being little or no galactose left in the blood at the end of two hours.



Galactose-tolerance curves showing amount of blood galactose after intravenous administration of 50 c.cm. of a 50% solution of galactose.

1. Fresh bakers' yeast is shaken with five times its weight of distilled water. 10 c.cm. of the mixture is transferred to a centrifuge tube, and the yeast is centrifuged down. The yeast is washed thrice by stirring up with 10 c.cm. of fresh distilled water and centrifuging. It is finally stirred and shaken with 10 c.cm. of isotonic sodium sulphate, and the suspension is ready for use.

TABLE I—BLOOD AND URINE GALACTOSE AFTER INTRAVENOUS INJECTION OF 0·5 G. OF GALACTOSE PER KG. OF BODY-WEIGHT

Blood galactose (mg. per 100 c.cm.)					Urine galactose, total excreted in 4 hrs. (g.)	Diagnosis
5 min.	½ hr.	1 hr.	1½ hr.	2 hr.		
160	149	76	26	0	—	Normal
115	28	0	0	0	3·2	Healed gastric ulcer
104	66	37	0	0	3·5	
147	40	5	0	0	3·1	Convalescent from pneumonia
194	76	63	60	5	—	Pneumonia
146	76	11	0	0	2·8	Cerebellar degeneration
—	63	26	15	5	4·7	Pulmonary tuberculosis, arthritis
95	—	17	0	0	2·9	Disseminated sclerosis
91	—	13	9	0	4·7	Pleurisy
94	—	29	20	0	5·1	Muscle strain
199	—	53	13	0	2·6	Duodenal ulcer
207	—	62	—	0	—	

TABLE II—BLOOD GALACTOSE AFTER INTRAVENOUS INJECTION OF 50 C.CM. OF A 50% SOLUTION OF GALACTOSE

—	48	—	16	0		Normal persons
300	53	12	10	0		
—	65	10	8	0		
130	69	30	8	0		
143	65	43	24	0		
130	88	75	20	0		
140	100	40	0	0		
—	60	30	18	0		
—	68	40	30	0		
160	—	32	16	0		
100	78	60	—	3		
190	92	86	30	0	—	Duodenal ulcer
148	47	35	19	6	4·6	Diabetes
187	98	28	3	0	2·5	Duodenal ulcer
132	57	16	16	0	4·8	Cystitis
228	162	97	0	0	6·0	Duodenal ulcer
200	113	31	31	0	—	
307	52	8	8	0	3·7	Normal
200	112	87	28	0	3·5	Coronary thrombosis
138	79	32	0	0	3·3	Duodenal ulcer
138	73	50	33	8	3·8	Gastritis
200	114	75	32	0	—	Myxœdema
226	120	89	32	0	4·9	Hæmochromatosis

In conditions of liver damage the level of galactose in the blood does not return to the normal level within the two hours. Representative curves are shown in the accompanying figure. From them the 5 minute results have been omitted. The detailed results are given in the tables. The level of blood galactose is extremely variable in the first (5 minute) specimen. This is inevitable because of the variable time which it takes to inject the galactose in different people. The ½, 1, and 1½ hour specimens show greatly different values for different people, but on the whole the curve of blood galactose appears to be lower in the normal, non-hepatic, and obstructive jaundice cases than it is in the toxic and infective groups. The 2 hour figure seems most important. In all normal and non-hepatic cases the blood galactose had dropped to less than 10 mg. at the end of 2 hours. In 8 of the 10 obstructive cases it had returned to 10 mg. or less. Of the 15 cases of toxic and other non-obstructive jaundice, 12 gave definitely abnormal results (one of them three times), and in the other 3 the slight clinical jaundice was of doubtful origin.

The urinary galactose (total excreted in the 4 hours following injection) was estimated in most of the cases. The results, given in the tables, do not bear any relation either to the blood galactose figures or to the clinical findings.

SUMMARY AND CONCLUSION

A galactose-tolerance test of hepatic dysfunction is described in which 50 c.cm. of a 50% solution of galactose is injected intravenously and the blood galactose is determined at intervals thereafter.

This modification of the galactose-tolerance test is free from theoretical objections, and the results given show that in nearly all cases it distinguishes clearly between jaundice due to liver-cell damage and jaundice due to gross obstruction of the biliary tract without liver-cell damage. That is its practical value; it is not suggested that it will detect minor grades of liver damage in patients who are not jaundiced.

TABLE III—INTRAVENOUS GALACTOSE-TOLERANCE TESTS IN JAUNDICE

Case	Blood galactose (mg. per 100 c.cm.) 5 min.	¼ hr.	1 hr.	1½ hr.	2 hr.	Urine galactose, total excreted in 4 hrs. (g.)	Diagnosis
	OBSTRUCTIVE JAUNDICE						
1	246	120	57	—	4	5·8	Carcinoma of head of pancreas
2	162	113	35	24	3	4·4	Obstructive jaundice
3	205	127	97	87	60	9·1	Malignant disease of colon
4	241	—	18	—	0	—	Three weeks' jaundice following parturition, thought to be obstructive
5	251	—	48	24	8	5·0	Carcinoma of stomach; obstruction of common bile-duct
6	128	—	68	—	10	1·8	,, ,,
7	255	231	81	37	24	5·2	Carcinoma of head" of pancreas
7a	202	125	65	16	16	—	,, ,, stomach"
8	136	—	16	—	0	—	Carcinoma of
9	152	—	12	—	6	—	Obstruction of common bile-duct
10	212	130	57	8	0	—	Carcinoma of head of pancreas
	JAUNDICE OF TOXIC AND OTHER ORIGIN						
11	194	150	98	98	57	—	Cirrhosis of liver
12	251	200	195	82	32	—	,, ,,
13	191	—	94	76	71	3·9	,, ,,
13a	183	—	112	87	79	4·3	,, ,,
13b	199	—	111	—	82	—	,, ,,
14	171	—	35	—	25	—	,, ,,
15	167	—	65	—	21	3·1	Splenic anæmia, enlarged liver.
16	178	—	65	16	15	—	Banti's disease, enlarged liver
17	348	194	121	97	56	—	Subacute recurrent hepatitis
18	267	137	115	81	29	5·5	Catarrhal jaundice
19	185	76	62	47	5	—	Catarrhal jaundice (2 wks.)
20	121	90	45	16	0	4·1	Catarrhal jaundice ?
21	160	143	—	16	16	—	Catarrhal jaundice
22	187	94	87	85	22	—	Alcoholism, gastric ulcer, jaundice
23	305	130	—	48	8	2·2	Hepatomegaly
24	327	—	74	65	28	2·4	Congestive failure, enlarged liver, 3 weeks' jaundice
25	278	187	71	—	39	1·2	Parkinsonism, enlarged liver, jaundice

7a, three weeks later; 13a, a week later; 13b, two months later.

Our thanks are due to Mr. G. E. Delory, Dr. T. von Haebler, Dr. Deborah Glaister, Dr. M. Selzer, and Dr. Alice Benjamin for their help in laboratory and hospital. We are indebted to Dr. W. A. Daley, chief medical officer of the London County Council, for permission to publish these results obtained on patients in the Hammersmith Hospital.

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EFFECT OF CALCIUM ON DIURESIS IN CARDIAC DECOMPENSATION

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IN many patients with cardiac failure one of the objects of treatment is to get rid of œdema fluid. Singer (1921) found that the intravenous administration of calcium salts caused a temporary diuresis in cardiac and renal disease. Cheinisse (1922) claimed that calcium aided the diuretic action of digitalis in patients with œdema of cardiac failure. Blum (1922) thought that calcium chloride exerted a powerful diuretic effect, but he attributed this to the chloride ion. Loewenberg (1923) found that, although small amounts of calcium, sufficient to increase the efficiency of ventricular contraction, did not exert a diuretic action, large doses did. Segall and White (1925) stated, as a result of their observations on seventeen patients, that calcium chloride could be used as a diuretic in patients who did not respond satisfactorily to the usual treatment. In contrast with all these workers Brull (1924) maintained that calcium had no diuretic effect but might even reduce the output of urine by vasoconstriction of the peripheral arterioles, including those of the kidney.

Most of the work previously undertaken on the diuretic action of calcium has been done with the chloride, which probably owes its efficiency to its acid-producing effect. In the present investigation it was desired to investigate the effect of calcium uninfluenced by any tendency to acidosis. Accordingly calcium gluconate was used; in later cases parathyroid extract was employed to raise the concentration of calcium in the serum.

CALCIUM GLUCONATE

Ten patients with cardiac œdema were studied. Calcium gluconate in doses of 10 c.cm. of a 10% solution was given intravenously every day for several days. The daily urinary output was measured, and the fluid intake was kept constant throughout the period of investigation. In one patient who had no previous drug treatment the calcium gluconate caused a slight increase in urinary output. Of the eight who had

INCREASE IN DIURETIC EFFECT OF DIGITALIS WHEN PRECEDED BY INJECTIONS OF CALCIUM GLUCONATE

Case	Treatment	Days of treatment	Daily average output of urine (c.cm.)
1	Digitalis	26	1250
	Calcium	6	1570
	Digitalis	8	1830
2	Digitalis	12	1450
	Calcium	3	1510
	Digitalis	10	1860
3	Digitalis	24	490
	Calcium	3	610
	Digitalis	18	870
4	Digitalis and mersalyl	52	1600
	Calcium	4	1480
	Digitalis	29	2160
5	Digitalis and mersalyl	42	1420
	Calcium	3	1280
	Digitalis	35	2150
6	Digitalis and mersalyl	50	790
	Calcium	6	700
	Digitalis	22	700
7	Digitalis	21	580
	Calcium	15	670
	Digitalis	30	750

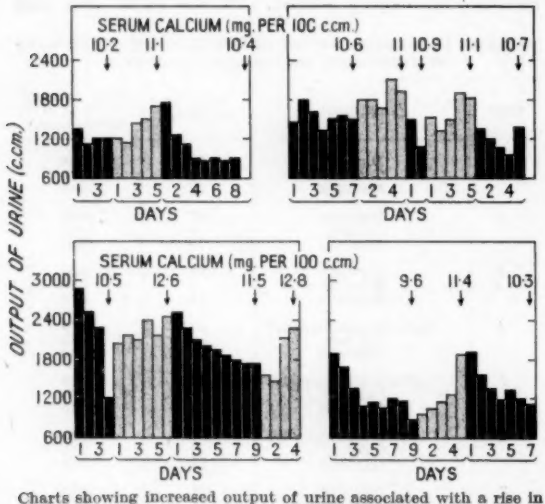
previously been receiving digitalis, the substitution of calcium gluconate produced in three a slight increase, and in three a slight decrease in the excretion of urine; in the other two, when calcium was given in addition to digitalis, there was a slight increase in diuresis. In one patient substitution of digitalis for calcium led to a definite rise in urinary output. It is obvious therefore that the administration of calcium has little if any effect on the output of urine. The results (see table) show, however, that in six out of seven cases, the injection of calcium gluconate enhanced the diuretic effect of digitalis. The increased diuresis obtained during the digitalis therapy following the administration of calcium gluconate suggests that calcium sensitises the diuretic action of digitalis, probably by improving its cardiotonic effect.

PARATHYROID EXTRACT

It has long been known that calcium plays a part in the regulation of water metabolism. Thus, during the perfusion of frogs with a fluid deficient in calcium œdema is rapidly produced. Clinicians, too, have remarked on the association of hypocalcæmia and œdema. The work of Salvesen (1934) and of Graham and Oakley (1938) and unpublished results of N. Morris and J. H. Hutchison indicate that calcium may exert a beneficial influence on impaired renal function.

The intravenous administration of calcium salts leads to a transitory rise in serum calcium. It seemed possible that the excretion of urine might be more affected by maintaining the serum calcium at a higher level continuously over longer periods. For this purpose Parathormone 20 units daily was injected either intramuscularly or intravenously. The effect of this procedure was studied in ten patients with cardiac œdema. In only one was there lack of response, in the remaining nine definite reduction of œdema was noted after treatment with parathormone was begun. In four of these nine it was possible to measure the daily output of urine. The figures show the increased diuretic response to parathyroid extract and a fall in urinary output when it was stopped and as the effect subsided. In two cases where a second course of parathyroid therapy was given a further rise in urinary volume took place. The charts (see figure) show that the increased output of urine is associated with a rise in the level of the serum calcium. The patient in whom parathormone did not produce diuresis showed no change in the level of serum calcium, which remained at 10·0–10·2 mg. per 100 c.cm.

These results indicate that the use of parathyroid extract enhances the effect of Mersalyl. The œdema was greatly reduced during treatment with parathormone; but, so far as could be ascertained, neither pulse-rate nor blood-pressure was significantly affected. It appears, therefore, that the parathyroid hormone, acting directly or through the increase in serum calcium, produced an effect either by the transference of fluid from water-logged tissues to blood-stream or by an action on the renal mechanism.



Charts showing increased output of urine associated with a rise in the level of the serum calcium. Black columns indicate administration of salyrgan; stippled columns, salyrgan and parathormone.

SUMMARY

Calcium gluconate was administered intravenously to ten patients with cardiac œdema. It had little immediate effect on the urinary output. In six out of seven patients who had previously been receiving digitalis the diuretic effect of this drug was increased when given after a course of injections of calcium gluconate. In nine out of ten patients with cardiac œdema injections of parathyroid hormone enhanced the diuretic action of mersalyl and digitalis.

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SPLINTS FOR FINGERS AND THUMB

By W. I. de Courcy Wheeler, Kt., M.D. Dubl., F.R.C.S.I.
SURGEON REAR-ADMIRAL, R.N.

In his recent book on fractures[1] Watson-Jones lays down four admirable rules for the treatment of injuries of the fingers and thumb: (1) the injured finger must be immobilised; (2) the injured finger must be immobilised in flexion; (3) no finger except the injured one must be immobilised; and (4) every uninjured finger must be actively exercised. The three splints illustrated here are designed to fulfil these requirements.

The *first splint* (fig. 1) has been christened the Baby Thomas. It provides extension and fixation for the thumb or first finger of either hand. If the size is reduced it is also applicable to the little finger. The shape and size of the ring were planned after experimenting with Stent, the pliable material used by dentists. The ring decided on is oval, with a longer diameter of 2 in. and a shorter of 1¼ in. The angle at which the ring is set and the shape of the opening are important in preventing too much pressure between the fingers and at the knuckle. The side bars are 4½ in. and 6½ in. long. Silver bronze wire of 14 gauge is used for the side bars and a slightly thicker wire for the ring. The latter is padded with ¼ in. saddler's felt covered with chamois leather. The side bars can be bent at any point to produce flexion, and a strip of strapping from bar to bar will act as a support behind. The splint is put on in the same way as a Thomas splint for the lower limb. A strip of adhesive strapping almost the length of the finger is applied to the skin along each lateral margin. Each strip has a loop at the end to carry the extension tapes or strings. The finger is surrounded with a single broad strip of Elastoplast, which prevents the extension strips slipping and gives comfort and protection to the skin. When the extension tapes are tied the splint and finger are enclosed by a simple bandage.

In the last war extension of the fingers by traction was found to be one of the only successful remedies for stiffness of the joints and contractures after injury. Slight extension, such as this splint provides, is sufficient for all purposes if it is maintained without interruption.

The *second splint* (fig. 2) is designed for immobilisation without traction. Most of the splints in common use immobilise the metacarpophalangeal joint and interfere with the free movements of the hand. They are often difficult to secure in position. This splint consists of two

1. Watson-Jones, R. Fractures and Other Bone and Joint Injuries, Edinburgh, 1940.

gutters made of thin sheet copper (20 or 21 gauge), which is easily obtained. The gutters are about an inch long and an inch wide. They are connected by a wire (14 gauge) which leaves a gap of slightly less than an inch between them. The wire must be firmly attached to the gutters so as to allow bending of the wire for flexion at either or both interphalangeal joints. The splint may be applied in three ways, two of which are illustrated in fig. 2 (B) (C). In the third the gutters are applied laterally and the wire runs obliquely across either the palmar or dorsal aspects of the finger. The position used will depend on the site of the injury. The splint is fixed to the finger by strips of adhesive which encircle the gutters, and the fixation may be reinforced by bandage, elastoplast or plaster-of-paris.

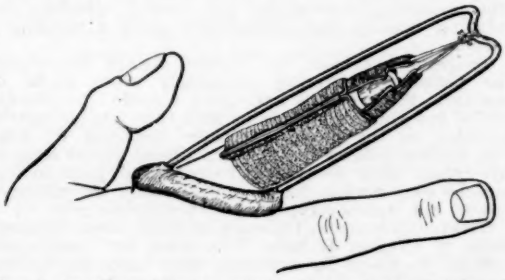

FIG. 1—Miniature Thomas splint. The extension strips of adhesive are surrounded by a single broad strip of elastoplast.

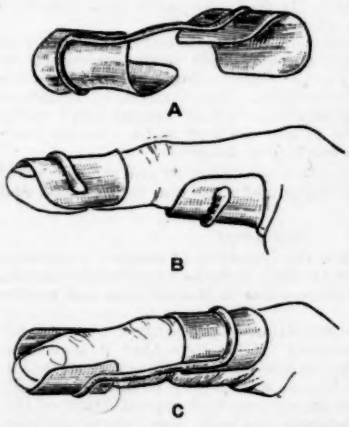

FIG. 2—(A) Splint for immobilising fingers without traction. (B) Applied in first position. The adhesive surrounding the gutters and finger is not shown. By bending the wire flexion can be secured at the interphalangeal joints. (C) Splint applied in second position.

The *third splint* (fig. 3), which has been described elsewhere,[2] is designed for Bennet's fracture of the thumb. It is a padded aluminium gutter splint with a large aperture at the distal end. A wire gallows is attached to this opening in the position of an abducted thumb. If the extension tapes are kept taut and the splint is firmly secured to the forearm with plaster-of-paris for about three weeks the result is satisfactory. Fixation for an additional three weeks in light plaster is usually desirable. A simple method of making a loop at the end of a strip of adhesive is shown in fig. 4.

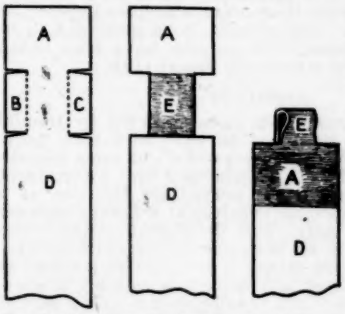

FIG. 4—Simple method of making loops on strips of adhesive strapping. The two flaps B and C are folded inwards into position E. A is then folded down on D. The shaded areas are non-adhesive.

* * *

Mobile fingers with a tendency to flexion contracture can be kept extended by strips of elastoplast applied as in fig. 5. It is well to put a little powder on the skin covering the proximal interphalangeal joint so that the adhesive will not stick at this point. The strip is applied proximal to the knuckle and is then stretched and carried down the dorsal aspect of the finger to the nail. A second strip is superimposed in the same way for reinforcement. To prevent these strips slipping the finger is surrounded by one broad piece of elastoplast. The dorsal strips act like an additional extensor tendon.

2. *J. Bone Jt Surg.* 1937, **19**, 520.

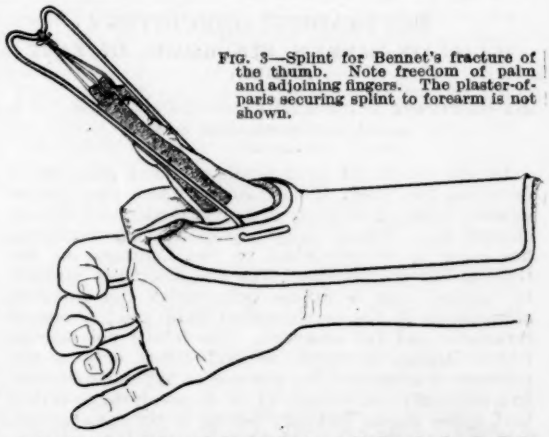

FIG. 3—Splint for Bennet's fracture of the thumb. Note freedom of palm and adjoining fingers. The plaster-of-paris securing splint to forearm is not shown.

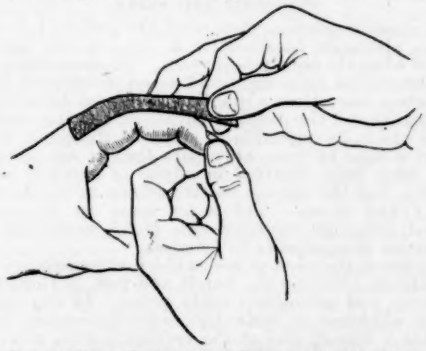

FIG. 5—Elastoplast strip applied to maintain extension. A second strip is superimposed and the whole is surrounded by one broad strip.

THE discovery of the ophthalmoscope was furthered by an ophthalmologist who remembered that his father had dismissed a servant because his eyes shone unpleasantly at night. Night-shining eyes, though common enough in animals, are rarely seen in man. The explanation was recently recalled in a letter from Sir John Parsons to *Nature* (Sept. 14, p. 366). The rays reflected from the fundus of the emmetropic eye emerge as a parallel beam and cannot enter an observer's eye unless it is directly in the beam—a fact made use of in ophthalmoscopy. In highly hypermetropic eyes the beams emerging diverge widely and the observer can catch the reflection from a considerable area. In the same way rays from a highly myopic eye may enter the eye of an observer after they have crossed. In either case the incident light must be very bright. Most mammals have hypermetropic eyes and some of them are equipped with a special reflecting membrane, the tapetum, which is absent in man. Glioma of the retina in the infant pushes the retina so far forward as to render the eye highly hypermetropic; the condition is usually discovered because the mother notices a yellow reflex from the pupil giving the so-called "amaurotic cat's eye" appearance. This mundane explanation of the business takes some of the shine out of luminous eyes. Who would give tuppence for a Dracula who was merely hypermetropic?

POLYRADICULONEURITIS (GUILLAIN-BARRÉ'S SYNDROME) IN EAST ANGLIA

By H. Stuart Barber, M.A., M.D. Dubl., M.R.C.P.I.
ACTING SQUADRON-LEADER, R.A.F.O.

In the winter of 1916 Guillain, Barré and Strohl described two cases of polyneuritis which they distinguished from other types of polyradicular neuritis and claimed as a clinical entity. Since then the condition has come to be recognised on the Continent as the Guillain-Barré syndrome. The characteristics stressed by Guillain are a diffuse polyneuritis, an acellular albuminosis in the cerebrospinal fluid and an almost invariable and full recovery. The febrile polyneuritis which Holmes described in 1917 differs only in the presence of fever and the absence of hyperalbuminosis. In a personal communication C. P. Symonds suggests that both types almost certainly belong to the same group, but that Guillain has over-emphasised the acellular hyperalbuminosis and Holmes the presence of fever. During the past winter a series of cases of polyneuritis occurred in East Anglia which in many respects resembled the Guillain-Barré syndrome.

SYMPTOMS AND SIGNS

The onset is sudden, often when the patient is in good health, although occasionally a sore throat may be present when the paralysis appears. An association with sore throat has been suggested as an ætiological factor even when more than a month has elapsed between the pharyngitis and the onset of paralysis, but this assumption seems to be unjustifiable since the disease is prevalent at a time of year when sore throats are common. Cases have been reported in adults of seventy and in children, but the disease mostly affects adults between twenty and thirty. The sexes seem to be equally affected, although Boudouresque (1938) maintains that the disease is commoner in females.

In most of the present series the first symptoms were paræsthesiæ affecting the hands and feet, a tingling or numbness and sometimes slight pains. In one patient sudden weakness in both legs was the earliest manifestation. Rarely one of the cranial nerves, especially the seventh, is first affected. When the paræsthesiæ were the earliest symptom, weakness of the limbs followed rapidly, often within 24 hours, and the resultant weakness rather than malaise compelled the patient to take to his bed. Fever in the two cases in which it was present was slight and transient. The motor symptoms were to some extent progressive, but when the legs and forearms were affected they were involved at the same time. Weakness of the muscles of the trunk is sometimes found. The distal parts of the limbs were commonly the most severely affected. In some cases there was a general weakness of all the muscles without complete paralysis, so that the coarser movements although ataxic were still possible. A striking feature was the symmetry of the paralysis. Transitory changes in the respiratory and cardiac rhythms have been recorded. In these cases the paralysis was flaccid and hypotomia was the rule, but hypertomia has been observed. The tendon reflexes were lost, and, although it is recorded that the superficial reflexes may disappear, in some of the cases reported here they were unusually brisk. Idiomuscular contractions on light percussion also became more active. There was no true muscular atrophy of the limbs involved and the electrical reactions while weak never showed the reaction of degeneration.

Paræsthesiæ of the extremities persisted for an appreciable time after the onset. Guillain (1933) says that violent spontaneous pain is sometimes present and in this series the muscles were usually tender on pressure. Objective sensory changes were slight, consisting of some diminution of pain, touch and temperature sensibility. Changes in deep muscle sensation and stereognosis have been observed. Involvement of the sphincters is uncommon but transitory. In one case there was incontinence of urine on two occasions.

The cerebrospinal fluid in some cases was characteristic but in others showed no abnormality. It was clear and not under increased pressure. The outstanding feature of the abnormal fluids was the increase in protein. Xanthochromia has been observed but is rare. The remaining constituents are normal, although the colloidal benzoin test occasionally gives a meningitic curve.

Progress was slow but almost always favourable, the patients recovering completely after weeks or months. Some deaths have been recorded by Boudin (1936) but Guillain maintains that these should not be included in the group originally described by him. The tendon reflexes may remain absent for as long as five years after recovery. Fatigue and pain in the muscles were present for some weeks after the return of power, but these disappeared with adequate rest.

Treatment consists of massage and exercises. Preparations of vitamin B have been used but results are difficult to assess in a disease that tends to recover spontaneously.

DIFFERENTIAL DIAGNOSIS

Polyradiculoneuritis must be differentiated from the following conditions.

Anterior poliomyelitis is characterised by a paralysis generally maximal at the time of the onset. The paralysis is typically atrophic and the paralysed muscles give the reaction of degeneration. In the cerebrospinal fluid there is no dissociation between albumin and cells.

Because of the association, immediate or remote, with sore throats, *post-diphtheritic polyneuritis* must sometimes be considered, especially as the cerebrospinal fluid may show the same changes in that condition. The paralysis in diphtheria develops fairly typically—an initial cranial-nerve palsy followed by weakness of one or more limbs. In the early stages a throat swab will help in diagnosis.

Syphilis will be recognised by the history and other physical findings or a positive Wassermann reaction in the blood and cerebrospinal fluid.

ÆTIOLOGY

Among the civilians the question of contact was ruled out. There appears to be a definite seasonal incidence, for the majority of cases occur in the autumn and winter months.

The cause of the condition is probably a neurotropic virus, although Biémond (1938) says that it lacks the essentials of a virus infection—a primary destruction of the nerve parenchyma, a tendency to spread rapidly throughout the nervous system and reproduction of the disease by inoculation. Guillain has unsuccessfully tried to transmit the disease to monkeys. Guillain and Barré suggest that the virus is more irritative than destructive and envisage a congestive œdematous state of the nerves which recovers completely. An intoxication has been suggested, but neither this nor a dietary deficiency seems likely in the present series. A neurotropic virus remains the only rational explanation. As with poliomyelitis, perhaps slight attacks pass unrecognised and confer immunity, while in some of the population the immunity is not so complete or the attacks are more severe. It is of interest that about the time when these cases arose there were widespread epidemics of mild "influenza" and rubella, both presumed to be virus diseases. Polyneuritic sequelæ have been noted after several cases of rubella by Sprott (1940).

HISTOLOGY

Pathological changes have been observed by Boudin (1936) in patients presumed to have died from polyradiculoneuritis, and Holmes carried out some investigations on two of his patients who died from intercurrent respiratory infections. The nerves are the site of a diffuse interstitial neuritis which is at a maximum near the origin of the nerve and diminishes towards the periphery. There is an irregular lymphocytic infiltration and the cells of the sheath of Schwann show a nuclear proliferation. Weigert and Scharlach staining demonstrates an alteration in the myelin sheaths and a partial fatty degeneration. The axis cylinders pursue an irregular course and their affinity for silver stains appears to be diminished. The root ganglia show similar changes. The brain is normal, but the meninges are sometimes

œdematous. The muscles show no changes. The continued absence of reflexes for a long period after the complete return of power remains a pathologically unexplained finding. It cannot be attributed to weakness of the musculature in patients who are able to walk and carry out their normal duties. It must therefore be due to a more serious involvement of the afferent links of the reflex arc than that sustained by the motor fibres.

TYPICAL CASES

CASE 1.—A patient, aged 22, admitted to a service hospital on Feb. 5, 1940. He had become ill on Feb. 1 with paræsthesiæ of the hands and feet followed by paralysis of all extremities. He had had a severe sore throat a month before.

Temperature normal. Paralysis of extensors of wrists, fingers, feet and toes. Loss of power in flexors of hands and legs. All tendon reflexes lost. Superficial reflexes present and brisk. Exceptionally brisk idiomuscular contractions easily elicited by light percussion. Cutaneous sensation, joint, deep muscle and vibration sense normal. Slight tenderness on pressure of muscles. Urinary incontinence on two occasions. Blood-count normal. Blood sedimentation-rate 3 mm. (Westergren). C.S.F. clear, not under pressure (protein 200 mg. per 100 c.cm., cells 4 per c.mm., W.R. negative).

On Feb. 20 he began to feed himself, and by March 11 he was getting up daily. On March 13 the C.S.F. showed protein 250 mg. per 100 c.cm., globulin +, cells 2 per c.mm., Lange 000000000. By July 10 power had fully returned. Some numbness at finger tips. Reflexes still absent.

CASE 2.—A patient aged 21, admitted to a service hospital on Feb. 22, 1940, complaining of pains in both legs, ankles and feet. He had had a sore throat in September, 1939, and had been admitted to a civil hospital with weakness of both legs in October, diagnosed as diphtheritic neuritis. After 14 days in hospital he had been unable to walk and later had developed weakness and paræsthesiæ in his hands so that he could not feed himself. He had been discharged to duty from the civil hospital on Jan. 8, 1940. Temperature normal. Power in lower limbs poor. Deep reflexes absent in all limbs; superficial reflexes normal. Cutaneous sensation normal. Some tenderness on compression of calf muscles. Blood-count normal. B.S.R. 4 mm. C.S.F. clear, not under pressure (protein 90 mg. per 100 c.cm., globulin +, cells 3 per c.mm., Lange 111100000).

By March 26 the deep reflexes had returned and the C.N.S. was normal.

CASE 3.—A patient, aged 20, admitted to a service hospital on Feb. 12, 1940. Diagnosis diabetes mellitus. He was balanced by Feb. 21 on 12 line diet and 35 units of insulin daily. Marmite was included in the diet. On the 30th he complained of weakness in both legs, which became more severe and compelled him to remain in bed next day.

Temperature normal. Paralysis of all muscle groups in both legs except quadriceps. Some loss of tone. Slight loss of power in upper limb. Except for sluggish triceps response tendon reflexes all absent; superficial reflexes normal. No paræsthesiæ or cutaneous sensory loss. Some tenderness of muscles on compression. No alteration in joint or deep muscle sense. Lumbar puncture not performed.

On May 17 he was up all day, and he was discharged on June 2, his reflexes still being absent.

The question of a diabetic polyneuritis arose in this case, but he was sugar free when the paresis set in and he made a spontaneous recovery without any alteration in his diet or insulin. Diabetic neuritis is unusual in young subjects and sensory symptoms are as a rule well marked. There was no evidence of a dietetic deficiency. He was seen by Prof. J. A. Ryle, who agreed that he could not be a case of diabetic neuritis.

CASE 4.—A soldier, aged 25, admitted to hospital on Dec. 26, 1939, complaining of severe pains and extreme weakness in all four limbs. He had had a sore throat on the day before admission, and gave a history of recurrent quinsies since the age of 13. He developed bilateral quinsy twice while in hospital.

Temperature normal. Complete loss of power in all four limbs. Muscles of limbs and erector spinæ hard and tender. Stiffness of arms and legs, at first taken for spasticity. Tendon reflexes thought to be diminished at first but became brisk in a few days. Superficial responses normal. Slight loss of cutaneous sensation over inner side of left arm. Extreme tenderness of all limbs. Sensations in other respects normal. Sphincters normal. Pupils widely dilated and unequal but reacted to light and accommodation. Slight weakness of right face. Blood-count normal. Lumbar puncture not performed.

Progress was very slow, and there was some wasting from the long period in bed. Pains ceased after 6 or 7 weeks. By April 8 he was able to sit up in bed but was still unable to feed himself. By July 1 he was able to walk.

ATYPICAL CASES

The remaining cases, although not fitting exactly into the syndrome of Guillain-Barré, arose during the same period and must be considered part of the epidemic.

CASE 5.—A patient, aged 21, admitted to a service hospital on Jan. 18, 1940, for suspected pneumonia. He had been in the station sick quarters for 11 days before admission. On the day before admission he had noticed weakness in both arms.

Temperature 103·2° F., pulse-rate 108, respirations 32. Weakness of deltoids in both arms. Tendon reflexes normal. No loss of sensation. Some numbness and tenderness on pressure of deltoids. Signs of bronchopneumonia at left base.

Jan. 20, right arm improved; some contraction in deltoid. Jan. 24, right deltoid muscle contracts normally; left shows no change; fullness at left base, small quantity of fluid aspirated. March 3, posterior fibres of left deltoid contract slightly. March 13, C.S.F. protein 48 mg. per 100 c.cm., cells 0·5 per c.cm., Lange 000000000. May 20, almost full power has returned to left deltoid.

CASE 6.—A schoolgirl, aged 15, admitted to Addenbrooke's Hospital on Dec. 12, 1939, complaining of backache for 14 days. On Dec. 9 the pains had become much worse and later she had developed diplopia and lost her voice.

Febrile. Both legs very weak. Tendon reflexes lost; superficial responses normal. Diplopia, loss of voice, difficulty in swallowing and nasal regurgitation. Retention of urine. No diphtheria bacilli obtained from throat or nasal swab on culture. Lumbar puncture not performed.

Dec. 16, developed lobar pneumonia; pupils fixed and dilated with poor reaction to light and accommodation; slight weakness of right face. The pneumonia was treated with sulphapyridine and gave no anxiety after first few days. Swallowing improved rapidly and voice returned. Jan. 19, 1940, still slight pyrexia; tingling and tenderness in toes; calf muscles slightly tender and tendo achillis on both sides extremely so. Discharged from hospital on Feb. 7, 1940, by then the tendon reflexes had returned and the palatal weakness had improved; both pupils remained large and sluggish in their reaction to light and accommodation; right facial weakness had disappeared.

CASE 7.—A platelayer, aged 35, admitted to Addenbrooke's Hospital on Feb. 28, 1940, complaining of paralysis of face. Three weeks before he had developed severe backache, soon followed by weakness of both legs. The legs gradually improved and when he was admitted full power had returned.

Temperature normal. Complete lower-motor-neurone paralysis of both facial nerves. Other cranial nerves normal. Motor power of limbs normal. Tendon and superficial reflexes and sensation normal. C.S.F., protein 20 mg. per 100 c.cm., cells normal, W.R. negative.

Discharged on March 21 with the facial weakness somewhat less.

In all the service cases the possible activation of a neurotropic virus by T.A.B. or A.T.T. was considered, but none of them have lately been inoculated or vaccinated.

Professor Ryle tells me that during the same period and in the same region he saw two more cases in consultation. The first was in a plump and healthy woman, who after a "cold and sore throat" developed extreme weakness in all limbs and pins and needles in the fingers and toes, but after ten days was well on the way to recovery. The second was in a young man who had an almost complete symmetrical paralysis of all four limbs without pain or sensory loss.

SUMMARY

Seven cases of acute polyneuritis seen in East Anglia between December, 1939, and February, 1940, were probably examples of Guillain-Barré's syndrome, though two were atypical. The ages ranged from 15 to 35 years. There had been no known contact between them.

The condition is most often seen in the autumn and winter. The onset is sudden, with paræsthesiæ of the extremities, sometimes preceded by sore throat. The paræsthesiæ are quickly followed by a flaccid symmetrical paresis of the limbs and sometimes of the trunk and face, with absent tendon reflexes, and muscular tenderness. Occasionally there is transient fever in the early stages. The cerebrospinal fluid often shows an increase in protein with no change in the cell content. Progress is slow, but complete recovery is the rule.

The main pathological change is a diffuse interstitial neuritis maximum near the origin of the nerves. The cause is probably a neurotropic virus, though there is no definite evidence of infectivity.

Diagnosis has to be made from anterior poliomyelitis, diphtheritic neuritis and syphilis. There is no specific treatment.

My acknowledgements are due to the Medical Director-General of the service. I have to thank Professor Ryle for permission to publish cases 4 and 6 and to Dr. C. H. Whittle for permission to publish case 7. I should also like to acknowledge the help of Professor Ryle and Group Captain C. P. Symonds R.A.F.V.R. in the preparation of this paper.

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MORBIDITY AND DEATH-RATES IN THE GREAT TOWNS

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THE Registrar-General's Weekly Return records the deaths from all causes and from seven infective diseases in each of the great towns—i.e., towns with a population of 50,000 or more—and the notifications of infective diseases in each separate administrative area; but in view of the large movements of population which have taken place, particularly affecting the age-groups most responsible for spreading many of these infections, it is difficult at present for anyone lacking the necessary information about these migrations to obtain a clear picture of the trends of death-rates or of morbidity in different parts of the country. At the beginning of September, 1939, some 735,000 school-children were removed under the Ministry of Health's arrangements from London and certain other ports and industrial towns designated as "evacuation" areas to more suitable "reception" areas, some of which were great towns.[1] During the ensuing months many children gradually drifted back to their homes; but it has been possible from the records at various dates to estimate approximately the mean populations of children resident in each area during each quarter of the year. There have been extensive movements also of other sections of the population which necessitate a quarterly revision of all local population estimates by means of the records of births, deaths, removals, and transfers to the non-civilian portion of the community.

This report compares the trends of quarterly death-rates up to the end of June, 1940, from all causes and from diphtheria, measles, whooping-cough, and cerebrospinal fever, corrected for all the measurable disturbing factors, in groups of the great towns classified as "evacuation," "neutral," and "reception" areas. Notification-rates (see figure) for scarlet fever, diphtheria, measles, whooping-cough, and cerebrospinal fever are also examined in the same way. It must be remembered in comparing these groups of towns that not only were children transferred in large numbers from the "evacuation" to the "reception" towns but also, perhaps more important in the case of some of the diseases, there was in the "evacuation" towns almost complete closure of schools during the December and March quarters followed by a large measure of reopening in the June quarter, whereas in the "neutral" towns there was partial closure and in the "reception" towns the schools remained open throughout. A social experiment on an unprecedented scale has thus been made, and some lessons may perhaps be learnt from the facts here presented.

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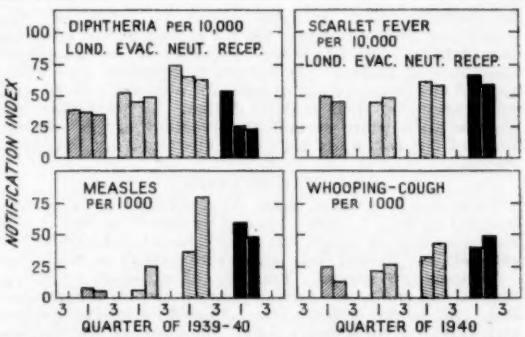


Quarterly notification indices at ages under 15 in London and in groups of other great towns in evacuation, neutral, and reception areas.

DEATH-RATES FROM ALL CAUSES

To obtain quarterly death-rates in the great towns really comparable with the national rate and with each other, the registered deaths were corrected to those of persons giving a residential private address, permanent or temporary, in the town; the populations at risk were estimated by the usual method up to August, 1939, and thereafter by means of the National Register machinery; and the resulting rates were then adjusted for the effects of differing age-constitutions of the populations by the use of the areal comparability factors, these being recalculated for periods since August, 1939, by means of the National Register and from information about the numbers of school-children billeted away from their homes at different dates. In the last three quarters the rates relate to civilians only. All the rates given in this paper are provisional figures subject to slight correction when the complete data are available.

TABLE I—ADJUSTED QUARTERLY DEATH-RATES FROM ALL CAUSES PER 1000 LIVING IN GROUPS OF GREAT TOWNS

Urban group	Quarters							
	1938		1939				1940	
	3rd	4th	1st	2nd	3rd	4th	1st	2nd
England and Wales ..	9·9	11·5	15·2	11·7	9·9	11·9	20·3	11·5
Greater London	8·9 *(86)*	10·6 *(87)*	14·5 *(91)*	10·2 *(84)*	8·9 *(86)*	11·3 *(89)*	19·7 *(90)*	11·2 *(99)*
Group of—								
"Evacuated" towns ..	11·6 *(112)*	13·5 *(111)*	17·2 *(108)*	13·7 *(113)*	11·2 *(109)*	13·6 *(107)*	24·3 *(111)*	13·9 *(111)*
"Reception"	9·5 *(91)*	11·1 *(91)*	14·5 *(91)*	11·1 *(92)*	9·9 *(96)*	11·3 *(89)*	18·8 *(86)*	10·2 *(82)*
"Neutral"..	10·5 *(101)*	12·3 *(101)*	16·0 *(100)*	12·2 *(101)*	10·7 *(104)*	12·9 *(102)*	22·2 *(102)*	12·7 *(102)*
126 great towns	10·4	12·2	16·0	12·1	10·3	12·7	21·8	12·5

The italic numerals in parentheses denote the percentage of the rate in the great towns.

Table I shows the adjusted quarterly death-rates, thus computed, in each quarter from mid-1938 to mid-1940 for England and Wales; Greater London; a group of great towns comprising the seventeen largest "evacuation" areas outside Greater London; a group comprising

all the great towns to which were sent school-children exceeding in proportion a third of the original population of the town at ages 5–14; a group comprising five of the largest "neutral" towns which were not disturbed by any official movements of school-children; and the 126 great towns as a whole.

The death-rate in the first quarter of 1940 in the country as a whole was 20·3 per 1000 civilians living, a rate which was last exceeded (20·9) in the first quarter of 1929, when a severe winter coincided with a considerable influenza epidemic. Since 1929, however, the age constitution of the population has changed progressively in a manner favourable to a higher crude death-rate, and comparison of the standardised death-rates (based upon the usual standard population of 1901) shows that the figure calculated for the March quarter of 1940, about 14·5, was well below that in 1929 (17·8) although above that for any March quarter since. In the 126 great towns the adjusted death-rates in the December, March, and June quarters of 1939–40 (comparable with the national crude rates in the first line of table I) were 12·7, 21·8, and 12·5 respectively, compared with 12·2, 16·0, and 12·1 in the corresponding quarters of 1938–39.

Greater London's adjusted death-rate from mid-1938 to mid-1939 was about 87% of the general average for the great towns, and this index rose to 90 for the first half of 1940. The group of "evacuated" towns, all outside Greater London and industrial areas in the main, had an index of about 111% of the general urban average in the period from mid-1938 to mid-1939, falling to about 108 in the latter half of 1939 but returning to 111 in the first half of 1940. The index for the group of "neutral" towns rose slightly from about 101 to about 102. In the group of "reception" towns the pre-war index of 91 rose to 96 in the September quarter of 1939 but has fallen in each quarter since, reaching the low level of 82% in the June quarter of 1940. The general conclusion from table I seems to be that, although at first the "reception" towns suffered and the "evacuation" towns benefited, as regards the general death-rate, owing probably to the transfer of an undue proportion of infirm persons at the outbreak of war, the relative position of the "reception" towns has steadily improved since, while that of Greater London has become rather less favourable.

The separate towns included which suffered the highest death-rates during the March quarter of 1940 were Manchester-Salford (30·2), Liverpool-Bootle (27·2), and Nottingham (26·0). Manchester-Salford normally has a death-rate about 20% above that of the great towns' aggregate, but in the severe March quarter the excess was 39%. In Nottingham, which normally has a death-rate about 9% above average, the excess became 19%. The Tyneside group of towns, on the other hand, with a normal excess of 15–20%, returned a rate below average in the March quarter of 1940 (21·3). Blackpool's death-rate, which was 12% above the great towns' average in the period from mid-1938 to mid-1939, has been 12% below average in the three quarters since the outbreak of war, but Plymouth and Portsmouth have shown

TABLE II—QUARTERLY DIPHTHERIA DEATH-RATES PER 100,000 LIVING AT AGES UNDER 15 (CORRECTED FOR TRANSFERS)

Urban group	Quarters							
	1938		1939				1940	
	3rd	4th	1st	2nd	3rd	4th	1st	2nd
Greater London ..	19	22	18	12	12	13	16	10
Great towns outside greater London—								
"Evacuation" areas	28	34	37	29	29	31	37	24
"Reception" areas ..								
Group A ..	26	28	42	16	18	27	13	16
Group B ..	21	25	16	22	9	19	21	13
Total	23	26	26	20	13	23	17	14
"Neutral" areas	36	40	47	22	21	37	31	35
126 great towns (including those in Greater London)	26	31	32	22	21	28	27	22

relative changes of the opposite kind. In the June quarter the rates ranged from over 14 in Manchester-Salford, Stoke, the Tyneside towns, and Liverpool to below 10 in Oxford, Cambridge, and Eastbourne.

DIPHTHERIA

Table II shows the death-rates for diphtheria, obtained by reducing the quarterly deaths (fully corrected for transfers) by a sixteenth to allow for the few deaths at ages 15 and over, dividing by a fourth of the estimated mean population at ages under 15 during the quarter, and multiplying by 100,000. In this table, as in tables V–VIII, all the great towns outside greater London are grouped into towns scheduled as "evacuation" areas at the outbreak of war; towns classed as "reception" areas to which were sent in the first instance school-children exceeding a third of the resident population at ages 5–14 (group A); towns classed as "reception" areas which received in the first instance smaller proportions of school-children (group B); and towns classed as "neutral" areas.[2]

In 1937 and in 1938 the diphtheria death-rate per 100,000 at ages under 15 in England and Wales as a whole was 31. For the great towns the corresponding index for the six months from October, 1938, to March, 1939, was 31·4, and for the corresponding period of 1939–40 it was 27·6; so no considerable change in the death-rate from diphtheria took place in the towns as a whole,

TABLE III—QUARTERLY DIPHTHERIA-NOTIFICATION INDICES PER 10,000 LIVING AT AGES UNDER 15

Urban group	Quarters					
	1938–39			1939–40		
	4th	1st	2nd	4th	1st	2nd
London County	89	65	52	39	38	37
Group of—						
"Evacuation" towns ..	84	78	58	52	46	49
"Reception" towns ..	37	50	25	49	23	21
"Neutral" towns ..	104	74	53	74	65	63
126 great towns	83	69	50	50	44	45
Remainder of England and Wales	117	97	60	112	74	68

notwithstanding the transfer of children and school closure in the "evacuation" areas during these months. In the year from mid-1938 to mid-1939 the average rate was 28, and in the year from mid-1939 to mid-1940 it was 25; so one out of every 4000 children under 15 continues to die annually in the towns of a disease which could be prevented by inoculation.

In Greater London the average index in the period from October to June, 1939–40, was 13, compared with 17 in the corresponding period of 1938–39. In the "neutral" areas the average index for the three quarters was 34, compared with 36 a year earlier. In the "evacuation" areas outside Greater London the quarterly rates from October to June were 31, 37, and 24, compared with 34, 37, and 29 a year earlier, giving no evidence of any effect either of school closure or of the transfer of children. In the "reception" towns the corresponding quarterly rates were 23, 17, and 14, compared with 26, 26, and 20 a year earlier, the death-rate being appreciably lower in the first half of 1940 than in 1939.

Table III compares the quarterly indices obtained by dividing 90% of the notifications (the estimated proportion at ages under 15) by a fourth of the estimated mean population of children under 15 during the quarter in London, the 126 great towns, and the three groups of towns used in table I.

The six months October–March being compared with a year earlier, in London and the other "evacuation" areas the proportion of children notified for diphtheria was lower by about half during this period of school closure, whereas in the "neutral" and "reception" towns here included it was lower by about 20%; but in the June quarter the rates both in the "evacuation" and in the "reception" groups were 16% below the

2. A slight source of error in the comparison between evacuation and reception areas is the fact that most of the children transferred were of school age. In 1938 the national death-rates from diphtheria at 0–5 and 5–15 years of age were respectively 36 and 29 per 100,000; so a 50% increase in the child population at 5–15 would depress the expected rate at 0–15 by about 2%. This correction is unimportant for the present purpose.

previous year's level. This suggests that school closure led to a reduced notification of diphtheria, although there was no corresponding reduction in the death-rate. The rise in the "neutral" rate in the June quarter was due to a considerable epidemic in one town. The "reception" towns showed an increase in the notification-rate in the December quarter, but this was not accompanied by an increased death-rate and was followed by a considerable fall in the March quarter.

TABLE IV—QUARTERLY SCARLET-FEVER NOTIFICATION INDICES PER 10,000 LIVING AT AGES UNDER 15

Urban group	Quarters			
	1939		1940	
	1st	2nd	1st	2nd
London County	84	92	49	45
Great towns of outer ring	101	104	39	41
Great towns outside Greater London—				
"Evacuation" areas ..	99	99	45	48
"Reception" areas ..	95	86	66	59
"Neutral" areas ..	117	104	60	58
126 great towns	100	99	52	51
Remainder of England and Wales	147	140	128	104

SCARLET FEVER

Scarlet-fever notification indices, obtained by dividing 90% of the notifications (the estimated proportion at ages under 15) by a fourth of the estimated mean population under 15 during each quarter, are given in table IV. The rates in the "reception" towns in both quarters were 31% below those of the previous year, whereas in the "evacuation" towns the decline was 54% in the March quarter and 52% in the June quarter, and in London 42 and 49% respectively. The fall was greater, therefore, in evacuation areas; and, in contrast with diphtheria, it was maintained after the reopening of the schools.

MEASLES

Table V shows the half-yearly deaths from measles in Greater London and in groups of great towns from 1936 to mid-1940 (four towns being omitted which were not included in the list of great towns until after 1936). No correction for transfer of deaths of non-residents has been made from September, 1939, and the numbers during the last two half-years may be slightly overstated on this account. In Greater London and some of the large industrial towns a biennial periodicity of measles epidemics has been the general rule in recent years, and comparison is best made with corresponding periods two and four years previously. On this basis of comparison Greater London deaths in the first half of 1940 numbered 5, compared with 339 in 1938 and 860 in 1936; in the "evacuation" areas outside Greater London they numbered 37, compared with 400 in 1938 and 707 in 1936. In the "neutral" towns there were 57 deaths in the first half of 1940, compared with 183 and 188, and in the "reception" towns 29, compared with 32 and 79. The percentage reduction in measles deaths compared with the first half of 1938 was, therefore, 98% in Greater London, 91% in the other "evacuation" towns, 69% in the "neutral" towns, and 10% in the "reception" towns. Reopening of the schools in the second quarter of 1940 in the "evacuation" towns was accompanied by an increase in deaths (from 13 to 24), whereas in the last two groups of towns where schools had remained open for the most part there was the usual seasonal decline (from 52 to 34).

TABLE V—HALF-YEARLY DEATHS FROM MEASLES

Year	Half-year	Greater London	Great towns outside Greater London					122 great towns
			"Evacuation" areas	"Reception" areas			"Neutral" areas	
				A	B	Total		
1936	1st	860	707	32	47	79	188	1756
	2nd	42	86	1	10	11	56	188
1937	1st	19	175	15	12	27	75	295
	2nd	25	242	7	10	17	38	322
1938	1st	339	400	14	18	32	183	926
	2nd	19	28	4	5	9	16	69
1939	1st	5	58	4	4	8	39	109
	2nd	1	24	–	7	7	21	53
1940	1st	5	37	13	16	29	57	126

Measles was made notifiable in November, 1939, and table VI shows the indices in the first and second quarters of 1940, obtained by dividing 97½% of the notified cases (the estimated proportion at ages under 15 [3]) by a fourth of the estimated mean populations of children under 15 during the quarter. In London this index was 68 per 10,000 children in the March quarter, and 46 in the June quarter; in the great towns of the outer ring of London the indices were 95 and 74; in "evacuation" towns outside Greater London they were 62 and 250. Reopening of schools did not precipitate the expected epidemic in Greater London so late in the year, but in most of the industrial areas of the north and in some Midland towns notifications in the June quarter were greatly in excess of those in the March quarter. Examples of the numbers of notifications in the successive quarters are: Manchester–Salford 265, 2537; Liverpool–Bootle 441, 1420; Newcastle–Gateshead–South Shields 157, 764; Leeds and Bradford 273, 1125; Nottingham 123, 1337; and Derby 21, 413.

TABLE VI—QUARTERLY MEASLES AND WHOOPING-COUGH NOTIFICATION INDICES PER 10,000 LIVING AT AGES UNDER 15, 1940

Urban group	Measles		Whooping-cough	
	1st quarter	2nd quarter	1st quarter	2nd quarter
London County	68	46	23	12
Great towns of outer ring	95	74	13	17
Great towns outside Greater London—				
"Evacuation" areas	62	250	21	26
"Reception" areas—				
Group A ..	545	636	48	45
Group B ..	624	250	34	53
Total	587	482	40	49
"Neutral" areas ..	366	805	32	43
126 great towns	217	375	26	31

In the "neutral" towns the measles index in the March quarter was 366 per 10,000 children—six times as great as in the "evacuation" towns—and in the "reception" towns it was 587—nine and a half times as great. In the June quarter the "neutral" index rose to 805—more than three times that in the "evacuation" towns—and the "reception" index fell to 482.

WHOOPING-COUGH

Whooping-cough deaths are shown in table VII (without correction for transfers since September, 1939, and therefore possibly overstated to some extent in the last two half-years). The whole year from mid-1939 to mid-1940 being compared with the three previous years, Greater London and the "evacuation" towns had a total of 168 deaths, compared with 754, 657, and 503; "neutral" towns had 75, compared with 195, 114, and 131; and "reception" towns had 44, compared with 73, 24, and 61. As in the case of measles, there was, therefore, a great reduction in whooping-cough deaths in "evacuation" areas and a much smaller reduction in other towns. The combined effect on the death-rate from measles and whooping-cough of the closure of schools during the winter and dispersal of children appears to have been favourable in the towns, even when full allowance is made for the progressive downward trend of the death-rate in recent years.

3. In St. Pancras, 1924–27, 97·5% of 6605 notifications were for children under 15.

TABLE VII—HALF-YEARLY DEATHS FROM WHOOPING-COUGH

Year	Half-year	Greater London	Great towns outside Greater London *				122 great towns
			"Evacuation" areas	"Reception" areas		"Neutral" areas	
				A	B	Total	
1936	1st	315	364	10	25	35	140	820
	2nd	107	157	8	12	20	103	378
1937	1st	232	258	23	30	53	92	616
	2nd	108	174	1	6	7	44	329
1938	1st	107	268	5	12	17	70	458
	2nd	48	90	5	14	19	32	186
1939	1st	164	201	13	29	42	99	477
	2nd	62	64	5	8	13	33	162
1940	1st	3	39	22	9	31	42	115

* Excluding three towns which were added to the list of great towns after 1936.

Whooping-cough notification indices per 10,000 children under 15 (table VI) in the great towns as a whole were 26 in the March quarter and 31 in the June quarter. In the "evacuation" areas they were 21 and 26 respectively, in the "reception" areas 40 and 49, and in the "neutral" areas 32 and 43. It is difficult to explain either this or the corresponding rates of measles incidence otherwise than by the removal of the schools as centres of infection during the winter in the "evacuation" areas and the intensification of infection, perhaps aided by lower levels of general immunity, in the "reception" towns. New York, however, has also had in 1938–40 the rare experience of two successive winters of low measles prevalence, so the possibility of other explanations must not be overlooked.

CEREBROSPINAL FEVER

Table VIII gives the quarterly notification-rates among civilians for cerebrospinal fever per 100,000 of the estimated population during the March and June quarters of 1940, with the death-rates (corrected for transfers) at ages under and over 15 and deaths per 100 notifications during the March quarter. The incidence, as measured by the number of civilian notifications in the quarter divided by a fourth of the estimated population at risk, increased in England and Wales from about 3 per 100,000 in the December quarter to 43 in the March quarter. In the Greater London towns the rate was 31,

TABLE VIII—CEREBROSPINAL-FEVER NOTIFICATIONS IN THE FIRST TWO QUARTERS OF 1940 AND DEATHS OF CIVILIAN RESIDENTS IN THE FIRST QUARTER

Urban group	Notifications per 100,000 estimated civilian population		Death-rates per 100,000 civilians in 1st quarter		Deaths per 100 notifications in 1st quarter
	1st quarter	2nd quarter	Ages under 15	Ages 15 and over	
London County ..	31	29	33	4·8	23·1
Great towns of outer ring			22	3·4	
Great towns outside Greater London—					
"Evacuation" areas	47	52	36	5·7	25·6
"Reception" areas	68	43	39	8·6	22·5
"Neutral" areas	45	40	26	6·5	23·7
Other urban areas ..	44	33	—	—	23·4
Rural districts ..	39	30	—	—	24·7
England and Wales	43	37	—	—	24·0

and in the "reception" towns it was 68, but in the other groups of areas shown in the table the rates did not appreciably differ from that in the country as a whole. The death-rate among children under 15 was 39 per 100,000 in the "reception" towns, compared with 36 in the "evacuation" towns, 33 in London, and 26 in the "neutral" towns. At ages over 15 the increase in the death-rate in the "reception" towns was relatively greater, the rate being 8·6, compared with 5·7 in the "evacuation" towns, 4·8 in London, and 6·5 in the "neutral" towns. The ratio of deaths at all ages to notifications did not vary appreciably from the England and Wales figure of 24%. It is evident that during the March quarter both the incidence and the death-rate of adults were higher in the "reception" than in the "evacuation" towns, but the death-rate of children was not sensibly higher. In the June quarter the notification-rate fell from 68 to 43 in the "reception" towns and declined also in areas outside the great towns, but in Greater London and the "evacuation" towns it scarcely changed.

The percentage age-distribution of the deaths for each sex during the March quarter in England and Wales was as follows:—

Age-group	All males	Females
0– ..	14·5 ..	10·8
1– ..	23·0 ..	20·5
5– ..	13·7 ..	15·3
15– ..	23·8 ..	17·2
25– ..	8·6 ..	7·6
35– ..	6·7 ..	4·7
45– ..	5·0 ..	8·8
55 and over ..	4·7 ..	15·1

The excessive proportion of elderly women is noteworthy. The ratio of deaths at all ages to notifications was high in Yorkshire and low in South Wales, the regional percentages for civilians being: North II 32·3, North III 32·1, East 27·4, Midland I 27·1, North I 24·7, Wales II 24·5, North IV 23·8, South-west 23·4, Midland II 21·3, and Wales I 16·6, compared with 24·0 in England and Wales as a whole.

SUMMARY

(1) The standardised death-rate from all causes was not so high in the March quarter of 1940 as in the severe winter quarter of 1929, but it was above that of any intervening quarter. Several large towns returned very high winter rates.

(2) The adjusted death-rate in those great towns which served as "reception" areas, after a temporary increase resulting probably from the influx of many infirm persons, has fallen relatively to that in Greater London and the "evacuation" towns.

(3) During the autumn and winter, when schools were closed in "evacuation" areas and partly closed in "neutral" areas, the diphtheria notification indices among children in London and the "evacuation" towns were only half those of a year previously, compared with a decline of 17% in the "reception" and 22% in the "neutral" towns, but there was no equivalent reduction in the death-rate. In the June quarter, when schools reopened, the contrast between "evacuation" and "reception" towns disappeared.

(4) The scarlet-fever notification index during the March quarter in the "evacuation" towns was less than half that of a year previously, compared with a fall of 31% in the "reception" towns, and this position did not change when the schools reopened in the June quarter.

(5) Measles and whooping-cough deaths during the March and June quarters amounted in the evacuation towns, as well as in Greater London, to a very small fraction of the numbers in previous years; the "reception" towns showed little change, and the "neutral" towns a moderate fall. The measles notification-rate per 1000 children under 15 in the "evacuation" towns was only 6 in the March quarter, rising to 25 in the June quarter, when the schools reopened, compared with 59 and 48 respectively in the "reception" towns. The whooping-cough notification-rate was half as great in the "evacuation" towns as in the "reception" towns in both quarters, the "neutral" group being intermediate.

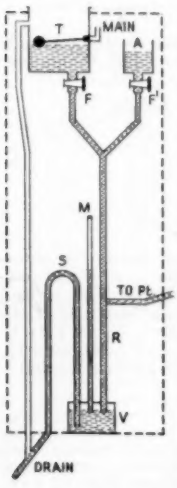
(6) The cerebrospinal fever notification-rate at all ages and the death-rate at ages over 15 during the March quarter were higher in the "reception" towns than elsewhere, but this was not maintained in the June quarter.

Grateful acknowledgement is made to the Chief Medical Officer of the Ministry of Health for his help in the issue of this report and to my colleagues at the General Register Office for assistance in its preparation.

New Inventions

APPARATUS FOR BLADDER LAVAGE

WHENEVER the function of the bladder is impaired, either by abnormalities of the nervous system or by mechanical obstruction to the outflow of urine, lavage through a catheter may be essential in controlling infection. The effect of routine bladder-washes is transient, and the labour involved when a number of cases require treatment is considerable. As a consequence, patients in a hospital can rarely have more than two bladder-washes a day. Some form of continuous lavage would clearly possess considerable advantages over the older methods, and the more nearly this lavage can be made to resemble the normal bladder cycle, the more readily will normal micturition be re-established afterwards. A simple apparatus which enables this to be done easily, and which is equally suitable for use with either a urethral catheter or a suprapubic drain, has therefore been evolved. It has been used on a number of neurological and surgical cases during the past year and has proved satisfactory.



The apparatus (see diagram) can be used for one or more patients. It consists of a closed vessel V from which three tubes emerge: S is a siphon tube connected with the drain, M is a manometer tube, and R a tube connecting to the patient and to the feed tubes F and F1, T is a tank of water, and A a reservoir of antiseptic fluid—e.g., 1/1000 oxycyanide of mercury, or 1/4000 potassium permanganate. The drippers can be arranged to deliver at about one drop per second, this arrangement being particularly useful when the number of cases to be treated at one time is large. For single cases the tank T and antiseptic reservoir A may be replaced by a simple glass vessel filled by hand.

When working, the top of the siphon limb should be slightly higher than the top of the patient's abdomen. This enables the bladder to fill with both urine and antiseptic solution at the same time. As the pressure in the bladder rises the fluid level goes up until it reaches the top of the tube S when siphoning occurs and the bladder is completely and rapidly emptied. This cycle can be repeated at any desired interval. With a flow of one drop a second emptying will take place approximately every two hours, and this will be found sufficient for most cases not grossly infected. For very infected urines the solution may be allowed to fill the bladder more rapidly. It should be remembered that the antiseptic will be diluted with urine and therefore stronger concentrations may be employed than are usual in the simple manual bladder-wash.

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Junior Assistant Pathologist, E.M.S.

Reviews of Books

A Textbook of Bacteriology

(3rd ed.). By R. W. FAIRBROTHER, D.Sc., M.D. Manc., M.R.C.P. London: William Heinemann (Medical Books). Pp. 451. 17*s.* 6*d.*

THE place of bacteriology in the medical curriculum has always been a problem. What should be taught and when? Probably the best solution would be to include something about the biology of bacteria in the preclinical course, to teach the principles of infection and immunity with systematic pathology, and to leave clinical or applied bacteriology to the final year when the student would be able to appreciate its diagnostic worth in medicine and surgery. This textbook is admirably designed to suit such an arrangement. The early chapters deal with the biology and cultivation of bacteria, and are followed by lucid accounts of infection, immunity and allergy (there is some ambiguity about the meaning of direct contact as distinct from droplet infection). The greater part of the book is concerned with the pathogenic bacteria and viruses, the diseases they produce, and the laboratory methods that help in their diagnosis and treatment. Perhaps the best compliment that can be paid to this section is to liken it to a condensed student's version of Topley and Wilson's larger textbook. The chapter on the staphylococcus contains recent work on the toxins and pathogenicity of that organism, the chapters on diphtheria, tuberculosis and the typhoid-dysentery diseases are particularly good and the review on virus infections has been brought up to date. There are still minor inaccuracies but the book both in its contents and format is undoubtedly one of the best of its kind.

Physiology of Sex and its Social Implications

By KENNETH WALKER, F.R.C.S. Harmondsworth: Penguin Books. Pp. 157. 6*d.*

THE listlessness with which a reviewer takes up yet another popular book on sex is rapidly dispelled in the case of Mr. Kenneth Walker's contribution to the Pelican series. Here is a man with a lively and original mind and style backed by a considerable store of wide knowledge. Against the biological background of sex he sketches in its psychological and social aspects. Provocatively but with great good sense he discusses among other things the marriage and divorce laws, chastity and sublimation, which last he is careful to distinguish from mere substitution. By true sublimation he seems to mean something akin to asceticism possible only to a few rare spirits and often far-reaching in its influence for good. His last chapter on sex and education is particularly worth reading.

Relativity of Reality

By RENÉ LAFORGUE, M.D. New York: Nervous and Mental Diseases Monographs, No. 66. Pp. 92. $2.50.

THESE five essays, which were first published in French three years ago, have interest for others than practising psycho-analysts, although the thesis in each is developed upon Freudian concepts. In a chapter concerning anxiety the author has avoided the more complex aspects of the formation of conflicts within the unconscious, and the translation makes comparatively simple reading. When he deals with the genesis of the need of causality and with the limitations in the use of intellect the author covers more difficult ground but nevertheless remains lucid. This is a considerable achievement on the part of both author and translator.

ROYAL COLLEGE OF PHYSICIANS OF IRELAND.—On Oct. 16 the fellows of the Royal College of Physicians of Ireland presented Dr. T. Percy C. Kirkpatrick with his portrait, painted by Mr. Leo Whelan, R.H.A., in recognition of his thirty years' service as registrar of the college. Dr. William Boxwell, president of the college, who made the presentation, referred to Dr. Kirkpatrick's zeal in the interests of the college and his eminence as a scholar of medical history. Dr. Kirkpatrick later read a short history of the Sir Patrick Dun's library, which formed the nucleus of the college collection of books.

On the same evening an extension to the library, m possible by a generous bequest from the late Dr. William Arthur Winter, a past president of the college, was declared open under the name of the Winter Hall.

The annual election of the officers and examiners of the college was held on St. Luke's Day. Dr. J. Rowlette was elected president, Dr. Victor Synge, vice-president. Dr. Henry T. Bewley was re-elected treasurer and Dr. T. P. C. Kirkpatrick registrar, and Dr. T. G. Moorhead representative on the General Medical Council. Dr. Rowlette, the new president, has been a fellow of the college since 1913. He is senior physician to Mercer's Hospital and King's professor of materia medica in the school of physic in Trinity College. He is also one of the representatives of the University of Dublin in the Senate of Ireland. Dr. Synge, the new vice-president, is physician to the Royal City of Dublin Hospital, and King's professor of the practice of medicine in the School of Physic.

THE LANCET

LONDON: SATURDAY, NOVEMBER 2, 1940

WAR BABY GROWING UP

IN a war notable for surprises the Ministry of Health has perhaps been called on to face more unexpected situations than any other body. The speedy ordering of the E.M.S. at the outset, which Sir FRANCIS FREMANTLE in the recent debate[1] on the health of the nation described as a monument of prevision, has proved itself in the long run, though it was freely criticised for many months. It was obviously impossible to predict when the alert would be followed by the alarm, though it has probably been easier to foretell the needs created by shelter life, crowding in evacuation areas, dislocation of medical practice and education by a shifting population, and many other aspects of national health which come within the purview of the ministry. Mr. MALCOLM MACDONALD in the same debate gave a confident account of medical services in action and prospect and in a broadcast on Tuesday evening he remarked that the hospitals had taken the war by surprise, not the other way round; but it would no doubt be a mistake to suppose that he is content with things as they are. He could, however, point to a framework on which it should be possible to build, a framework which includes such things as facilities for the investigation and treatment of injuries and disease, the transfusion service (organised by the Medical Research Council) with its rapid progress in the study of methods of blood-storage, and the hope of an effective rehabilitation service. E.M.S. hospital beds are being made available not only to fighting men and civilian casualties, but to munition workers, exhausted mothers and children from the bombed areas, and the chronic sick and the aged. It will need constant vigilance if these very different types of patient are to be so distributed that the care of the injured and the acutely ill is not hampered by the presence of chronic sick in the ward. The shelters provide a complex of urgent medical problems which should take precedence of all others just now. No-one who has read Mr. MACDONALD'S speech can doubt his anxiety to safeguard the physical and mental health of the people, but the magnitude of the task was vigorously impressed on him by Dr. H. B. MORGAN, who was impelled not merely by his own distaste for the voluntary system when he urged that all hospitals should be brought under the control of a single department. His plea that the minister should organise local government from the health aspect as well supported. It is our boast that under democracy one service grows naturally out of another as the need for it becomes apparent. This has the disadvantage of a time-lag.

The Ministry of Health, following the democratic principle, established the E.M.S. on the existing hospital service of the country. But can new wine be put into old bottles? Not without some disasters. Unlike the Pensions ministry, the Health ministry had no hospitals of its own and no previous experience of hospital management, nor had it powers of compulsion over the local authorities whose hospitals were brought into the scheme; it has been unwilling to exercise fully powers conferred by the defence regulations. In founding the E.M.S. the experts transferred from the Ministry of Pensions had to choose between building new hospitals and grafting the service on those already existing. From the administrative viewpoint it would no doubt have been simpler to build, but it would have been a piece of grave extravagance, entailing endless duplication. Moreover, in the absence of special legislation, the ministry only had power to act by financing existing bodies. Once this course was taken the ministry participated in the management of every type of hospital in the country—voluntary hospitals, county and municipal hospitals, hospitals under public-assistance committees, and hospitals governed by visiting committees under the Board of Control. Local colour has made the task more difficult. Some counties have few general hospitals of their own and still make do with their public-assistance institutions; others have availed themselves of the privileges open to them under the Public Health Act of 1929. Those which achieved the highest standard in health administration during the years of peace have satisfied most readily the demands of the E.M.S. The representatives of the ministry decided not to displace existing officers, feeling that their terms of service and pension deserved to be respected. But the work introduced by the E.M.S. was often quite different in kind and standard from that to which the hospital was accustomed. In some hospitals special officers were appointed to take charge of E.M.S. beds, but the medical superintendent—with few exceptions—remained in supreme control. The matron also was left in full charge of the nursing staff even where, as was sometimes the case, she held office as master's wife without a state qualification. There are keen, broadminded medical superintendents; there are others not so broadminded. Nor can all the blame be laid on one side; members of voluntary hospital staffs seldom have much liking for bureaucracy. Some of them have tried to carry into public institutions customs of the voluntary system which cannot be made to fit. In this confusion of interests and control it was inevitable that medical education, and to a lesser extent nursing education, should suffer. The ministry, unaccustomed to hospital beds, is equally inexperienced in the needs of medical students. No doubt it was assumed that teaching would just go on. But the teaching of clinical subjects is largely voluntary in this country; it is one of the returns which a consultant makes for the privilege of being attached to a teaching hospital. Under the E.M.S. he has no incentive to voluntary service of this kind, and he can scarcely be blamed if his interest wanes. The fact that many hospitals are still contriving to give clinical training at all comparable with that of the past is a tribute to the generosity and keenness of their teaching staffs.

England in peace is locally governed, a system which has the advantage that the needs of a district are watched by those who live there and are met by local funds. But the municipal hospitals have lost for the time being their local character; their patients are likely to come from any area, to be civilian or military, old people or children. The attempt to run a service embodying the powers both of the ministry and the

1. House of Commons, Oct. 17, see *Lancet*, Oct. 26, p. 526.

local authorities is not entirely successful. Dual governance makes for multiplication of restrictions and stifles initiative. Other state departments are getting into their stride and health is a large element in home security.

TESTS OF LIVER FUNCTION

THE liver has many functions, too many in fact for most of us to remember, and every year the biochemist invents fresh methods of testing them. Yet the clinician does not appear to be satisfied. Is this because they are all valueless or because the wrong use is made of them? Tests of liver function are needed to detect liver damage either in the absence or in the presence of jaundice. When jaundice is absent any function of the liver could be exploited, and the most convenient procedures are perhaps those which test the power of the liver to excrete bile—the van den Bergh reaction, the icterus index, the serum-phosphatase estimation, and the bromsulphalein-excretion test. Nevertheless, other functions are more likely to be impaired in certain diseases, for example, the Takata-Ara reaction and the plasma-protein estimation have found particular favour in cirrhosis of the liver. On the other hand, where jaundice is present any test based on biliary excretion is likely to be useless, since the colour of the patient is sufficient indication that excretion is impaired. This proposition does not quite cover the case of hæmolytic jaundice, which is however not difficult to eliminate on clinical grounds.

In jaundiced patients the problem is usually to distinguish between toxic and obstructive jaundice. It is, of course, possible that differences in the chemical structure of the bilirubin in the blood may exist in the two conditions, but if they do most pathologists would agree that the van den Bergh reaction cannot be relied on to detect them, and it is evidently preferable to test a function which is independent of excretion. Of the numerous possible alternatives we have most experience in this country of the hippuric-acid test in the form introduced by QUICK[1] in 1933, and the galactose-tolerance test due to the work of BAUER[2] in 1906. The lævulose-tolerance test, the theoretical basis of which is less impressive, has been studied recently in an improved form by HERBERT[3] and by STEWART, SCARBOROUGH and DAVIDSON[4]; and a new-comer to the field, at present purely empirical, is the serum-cholinesterase estimation of MCARDLE.[5] In the first of these, the sodium benzoate may be administered either by mouth or intravenously, but the urinary excretion of the conjugated hippuric acid has to be relied on, thus introducing a further variable. The oral modification of the galactose test has lately been studied by MACLAGAN,[6] using a new analytical method which estimates blood galactose as such. He obtained promising results in jaundice and showed a striking impairment of tolerance in hyperthyroidism which has been the subject of a further paper by MACLAGAN and RUNDLE.[7] A difference of opinion has arisen over the high oral galactose curves which are evidently a fairly constant finding in this condition, for they are ascribed to liver damage by MACLAGAN and his colleagues, but to increased intestinal absorption by ALTHAUSEN, LOCKART and SOLEY.[8] Both groups of workers agree as to the clinical value of the test in hyperthyroidism. The intravenous galactose test is described in this issue by KING and AITKEN, who also determine blood galactose. Their results show a fairly sharp distinction between toxic and obstructive jaundice. KING, HARRISON and DELORY have applied the test to the study of experimental liver necrosis in rabbits, impairment of function being demonstrated in every treated animal. The choice between the oral and intravenous galactose tests appears to depend chiefly on clinical factors. The former is more convenient since it avoids the sterilisation and injection of 50 c.cm. of galactose solution but it is contra-indicated by vomiting, pyloric stenosis and the like.[6] In Graves's disease only the oral technique is known to give positive results. Until the publication of this group of papers it was usual to estimate either urinary galactose or total blood-sugar and the estimation of blood galactose as such constitutes a real technical advance. An essential limitation of any liver-function test in jaundice is provided by the atrophic or cirrhotic changes in the liver which may be produced by prolonged biliary obstruction[9]; some sort of time-limit must be imposed if diagnostic help is expected. Further information is required on this point, but normal galactose function is probably retained for at least three weeks in simple obstructive jaundice, and may sometimes persist for as long as eight weeks.[6] This limitation does not imply that liver damage in obstructive jaundice is of no interest to the surgeon but merely that moderate damage does not necessarily imply a toxic jaundice after a long period.

It is barely possible to perform all these tests on one patient, and progress is most likely to be made if each team concentrates on two tests, one excretory and one non-excretory. The principal need is for the careful correlation of the results with clinical data, particular attention being paid to the duration of symptoms, for it is at present more difficult to interpret the significance of liver damage than to demonstrate it.

NEW ALKALOIDS FOR OLD

FEW are better qualified than pharmacologists to appreciate that arresting apostolic exclamation "Behold, I show you a mystery," for in the realm of pharmacology there are mysteries enough and to spare. The metaphysical relationship that may exist between man and the drugs that he has discovered in nature is a big subject but we may wonder why the active principles of drugs are distributed so unevenly. Opium, for example, contains upwards of thirty alkaloids while ipecacuanha must rest content with one. Many generations of pharmacologists have attacked the opium alkaloids, and they have established the interesting fact that these principles have been blended with due regard to the accepted conventions of prescription writing. They fall into two main groups—the phenanthrenes represented by morphine and codeine, which increase the tone of plain muscle; and the isoquinolines, of which

1. Quick, A. J. *Amer. J. med. Sci.* 1933, **185**, 630; 1939, **6**, 716.
2. Bauer, R. *Wein. med. Wschr.* 1906, **56**, 2537.
3. Herbert, F. G. and Davison, G. *Quart. J. Med.* 1938, **7**, 355.
4. Stewart, C. R., Scarborough, H. and Davidson, J. N. *Ibid*, p. 229.
5. McArdle, B. *Ibid*, 1940, **9**, 107.
6. Maclagan, N. F. *Ibid*, p. 151.
7. Maclagan and Rundle, F. F. R. *Ibid*, p. 215.
8. Althausen, T. L., Lockart, V. C. and Soley, M. H. *Amer. J. Med. Sci.* 1940, **199**, 342.
9. Gibson, W. R. and Robertson, H. E. *Arch. Path.* 1939, **28**, 37.

papaverine is perhaps best known to the clinician on account of its ability to reduce tone and peristalsis of the intestine and relax involuntary muscle of other viscera. The adjuvant and corrective actions of the opium alkaloids have a certain academic interest, but if we were reduced to using one and only one of them in therapeutics morphine would be the universal choice. It is not, however, the ideal analgesic. The drug has still to be discovered that will abolish pain without producing any unpleasant side-effects. The drawbacks to the use of morphine are dryness of the mouth, loss of appetite, nausea, vomiting (especially in women and cats), constipation, depression of respiratory function, and lethargy, but they are of little moment when one is confronted with a patient suffering from agonising pain. One of its subsidiary actions is of great value when the aim is to relieve pain and promote intestinal quiescence, but such cases are relatively uncommon, and in the ordinary run of practice the side-effects of morphine are a bugbear to patient and doctor alike. Research in the past half-century has aimed at modifying the morphine molecule in such a way that its analgesic action may be retained or even enhanced while its side-effects are eliminated.

DRESER, in 1898, synthesised diacetylmorphine which is twice as powerful as morphine as an analgesic; but the mere mention of its sinister synonym "heroin" suffices to condemn it. Notwithstanding the oft-repeated contention that heroin surpasses morphine in its selective action on the cough centre authorities are agreed that opium or morphine are sufficiently effective in abolishing a useless cough. If it be urged that the side-effects of morphine are absent when diamorphine is used, it may be pointed out that this advantage, depending as it does on the different mode of excretion, can be secured by resorting to methylmorphine (codeine); and that addiction to codeine is almost unknown. Heroin is no longer included in the United States Pharmacopœia, and this is a lead that merits the attention of the British Pharmacopœial Commissioners. Unfortunately codeine has only a weak analgesic action, and there are two disadvantages in pushing the dose. In the first place, it is much more expensive than morphine, and secondly, side-effects resembling those of morphine appear after administering full doses over a period of several days. This is not inconsistent with the statement by MYERS [1] that "the effects of codeine upon the alimentary tract do not deviate much from the normal and would not produce a constipating action"; his conclusions from experimental work are in accord with clinical observations provided that the patient receives small or moderate doses (less than gr. 4 daily).

In recent years interest has centred on other synthetic morphine derivatives and in particular Dilaudid (dihydromorphinone hydrochloride), Dicodid (dihydrocodeinone hydrochloride) and Eukodal (dihydroxycodeinone hydrochloride). These compounds compare favourably with morphine in that they are not so likely to lead to addiction. Their relative strengths as analgesics are only now being worked out by a new technique that has already been noted in these columns,[2] but it seems that these new alkaloids have 75–100% of the effectiveness of morphine. MYERS concludes that "there is no experimental evidence to suggest that the administration of dicodid would ever produce constipation; dilaudid is probably a constipating drug, although this effect may not be so marked as that produced by morphine; small doses of eukodol are not constipating, whereas large doses in certain circumstances . . . may produce a mild degree of constipation." It is clear therefore that we are now in a position to exercise more discrimination when prescribing drugs of the morphine series. If certain side-effects are desired in addition to the analgesic action, morphine is still the drug of choice; if, on the other hand, a purely analgesic action is aimed at, with a minimum of disturbance in other systems of the body, the possibilities presented by the new alkaloidal salts are very attractive.

1. Myers, G. N. *J. Hyg., Camb.* September, 1940, p. 583.
2. *Lancet*, 1940, **2**, 167.

THE SPRUE FAMILY

Dr. SAMUEL GEE, in his original description in 1888 of the cœliac affection, emphasised the analogy between this complaint in infants and the cases of tropical sprue seen in those returning from India. Since then there has been much discussion of the relation of cœliac disease to tropical and non-tropical sprue, and the question is not likely to be settled until their causes have been discovered. IZOD BENNETT and HARDWICK [1] have attempted a classification to embrace diverse instances of the cœliac syndrome, characterised by steatorrhœa, tetany and macrocytic anæmia. Although the mechanics of digestion are normal or little altered, foodstuffs are not absorbed; this failure of absorption applies especially to fats and carbohydrates but they consider that proteins, vitamins and mineral salts are also implicated. This unexplained failure of absorption, when it occurs in young patients, results in skeletal deformity, defective growth and infantilism. Prof. ROBERT DUBOIS [2] correlates the clinical aspects with the experimental work of VERZAR of Basle on absorption from the intestine of rats of foodstuffs and growth-promoting substances. The physical processes of filtration and osmosis adequately explain the absorption of some substances while others seem to be subjected to the vital activities of the cells lining the alimentary canal. These cells can be poisoned with monoiodoacetic acid, producing in rats a condition which has many resemblances to the cœliac affection of children and adults. The earlier clinicians considered that fat absorption was defective, the other substances only being affected secondarily, either directly (fat-soluble substances and calcium) or indirectly (substances destroyed when delayed in the lumen of the bowel); but as BENNETT and HARDWICK point out there is in sprue, cœliac disease and the other members of the syndrome a gross interference with the total function of the small intestine. Professor DUBOIS has made elaborate biochemical tests on several of his cases of cœliac disease. He finds that, although proteins are absorbed up to the normal extent, fats, glucose and galactose are not. The disturbed metabolism of phosphorus and calcium, the intermediate metabolism of protein break-down products, the poor absorption

1. Bennett, T. I. and Hardwick C. *Lancet*, 1940, **2**, 381.
2. Clinique et physiopathologie des maladies cœliaques. By Robert Dubois, médecin adjoint de la clinique infantile de l'université de Bruxelles. Paris: Masson et Cie. Pp. 350. Frs.80.

of vitamins and the anæmia are in his view secondary. So far it has not been possible to demonstrate any characteristic lesion. BENNETT and HARDWICK remind us that gastro-colic fistula can produce a comparable deficiency disease. In a case of acute obstruction where the upper jejunum and the ascending colon had been anastomosed, sore mouth, frequent bulky and fatty stools, macrocytic anæmia and tetany occurred. Deficiencies were made up, but cure was not obtained until the continuity of the bowel had been restored. They suggest that cœliac disease, tropical sprue, Gee's disease, gastro- or entero-colic fistula and interference with the intestinal lymph-channels may produce a syndrome dependent on chronic jejuno-ileal insufficiency with consequent defects of secretion and absorption. VERZAR has suggested that these disorders are due to some disturbance of the functions of the suprarenal cortex, but though his theory is based on experiment it has not yet been confirmed by clinical, anatomical or therapeutic observations in man. Clinicians are at present divided between the old toxi-infective theory of causation and that of a deficiency of vitamin B_2.

Annotations

VITAMIN B_1'S PART IN METABOLISM

THE simplest definition of the vitamin-B complex is that it is an assemblage of the water-soluble vitamin factors present in yeast. Yeast is an organism of which each cell is a laboratory engaged in an active form of carbohydrate metabolism, and the fascinating picture which is gradually being drawn shows the B vitamins more and more clearly as essential constituents of the enzymes controlling the key process in carbohydrate oxidation and reduction in both the yeast cell and the animal body. This position is established as regards vitamin B_1, nicotinic acid and riboflavin; understanding of it has perhaps gone furthest in the case of vitamin B_1 because studies with animal tissues in vitro have shown vitamin B_1 to have a specific action. Professor Peters [1] in 1932 was the first to demonstrate that oxidation of pyruvic acid by brain tissue was promoted by the presence of vitamin B_1. Since then he and others have made great progress, and in an article in *Nature* [2] he gives a careful analysis of the existing evidence of the place of vitamin B_1 in metabolism, followed by as complete a synthesis of the whole picture as he feels is justified.

In his work in vitro on the brains of pigeons deprived of vitamin B_1, Peters established the feeble capacity of the brain tissue of the deprived birds to oxidise pyruvic acid, and the efficiency of added vitamin B_1 to correct this enfeebled capacity. That in this process vitamin B_1 functioned as a constituent of an enzyme was made clear through the work of Lohmann and Schuster,[3] who isolated in crystalline form the already known co-enzyme, cocarboxylase, and found that it was vitamin B_1 pyrophosphate. Peters poses several questions still outstanding. Is the vitamin in the animal tissue, as in the yeast cell, only active in the phosphorylated form? What is the distribution of the factor? How is it synthesised by animals and yeast? What exactly does it do in the metabolism of pyruvic acid? The first question Peters answers definitely in the affirmative.[4] and he gives proof that vitamin B_1 in various tissues only becomes active after it has been phosphorylated to cocarboxylase, but it can be transported in the blood in the free form. In optimum conditions one molecule of cocarboxylase can catalyse the uptake of 1500 molecules of oxygen per minute. The evidence that synthesis of cocarboxylase takes place in the liver and brain of animals and in the yeast cell is also accepted, and in the latter case it is greatly furthered by the presence of adenosine triphosphate.

The reactions induced by cocarboxylase in yeast are comparatively simple, acetaldehyde and carbon dioxide being produced from pyruvate, but in the animal the processes involved in the oxidation of pyruvate are much more complicated and acetaldehyde never appears. The exact course of these reactions is not yet clear in spite of much and varied attack, but Peters ends by remarking that "we can at least say that we know much better now why vitamin B_1 is important." This is a very modest estimation of the achievement. Twenty years ago it would have seemed rash to suggest that so soon we should have clear insight into the chemical reactions activated by any known vitamin in its capacity as a constituent of an enzyme. Perhaps it is not rash to hope that in another 20 years we shall have insight into the effect of disorders in these chemical reactions on the mental state. The irritability of fatigue and the insanity of pellagra may alike have their cause demonstrated when the delicate mechanism of oxidation and reduction in relation to the B vitamins as enzyme constituents is fully understood.

1. Gavrilescu, N., Meiklejohn, A. P., Passmore, R. and Peters, R. A. *Proc. roy. Soc.* B, 1932, **110**, 431.
2. *Nature, Lond.* 1940, **146**, 387.
3. Lohmann, K. and Schuster, P. (1937) *Biochem. Z.* 1937, **294**, 188.
4. Banga, I., Ochoa, S. and Peters, R. A. *Biochem J.* 1939, **33**, 1109, 1980.

SODIUM SULPHAPYRIDINE

Sir William Ogsden used to describe numerous ways of treating a condition which had been tried and abandoned, with the remark that he mentioned them simply to prevent valuable time being wasted in their reinvention. Every stage in the development of modern chemotherapy has been in the hands of capable men who have applied critical pharmacological tests to products likely to be of value in medicine. Fortunately, too, there has been a close liaison between the chemist and experimenter in the laboratory and the doctor at the bedside in deciding on dosage and methods of administration. Not all of the preliminary work has, however, been published, and occasionally an old method is resurrected when there is good reason for leaving it buried. Lately Ratish and others [1] have been giving sodium sulphapyridine by mouth, a route that has been tried before and discarded because of the excoriation of the mouth and œsophagus that it may produce. As W. R. Thrower has pointed out [2] the pH of this salt is approximately the same as that of N/10 caustic soda, and though theoretically it should be absorbed from the intestinal tract more rapidly than sulphapyridine itself this advantage is not sufficient to offset its causticity. Ratish and his colleagues do not seem to have noted any local excoriation, though they mention some nausea and vomiting. They treated seven cases of pneumococcal pneumonia with sodium sulphapyridine by mouth in doses of 5 g., and found that an effective concentration of the drug in the blood was attained more quickly than in controls who received equivalent amounts of sulphapyridine, but the therapeutic results seem to have been much the same. The evidence they put forward to support the contention that there is less acetyl sulphapyridine present in the blood when the sodium salt is used is unconvincing, except in isolated cases. Their method of estimating the drug was a reliable one, but they so often recorded levels of free sulphapyridine higher than the corresponding total levels that the accuracy of their work is questionable. Certainly more secure evidence would be required before oral administration could be advised as a routine.

1. Ratish, H. D., Davidson, R. and Bullowa, J. G. *J. Pharmacol.* August, 1940, p. 365.
2. See *Lancet*, 1940, **1**, 1090.

When rapid absorption is essential or vomiting makes it impossible to give sulphapyridine by mouth the sodium salt can be given dissolved in 10 c.cm. of normal saline intravenously, or dissolved in two parts of distilled water intramuscularly. An intramuscular injection must be given slowly and deeply into the muscle, for Thrower has demonstrated the local necrosis that it produces. The salt can only be given subcutaneously if the dose is diluted with about a litre of normal saline and run in at a rate not greater than 200–300 c.cm. per hour, as advised by Taplin, Jacox and Howland.[3] In our issue of Oct. 12 (p. 470) Dr. M. Hunter described two cases of cerebrospinal fever which had received intrathecal injections of sodium sulphapyridine before they came under his care. Both, as might have been expected, developed lower motor neurone lesions of the lower limbs, and the introduction of any of the soluble sulphonamides into the theca is a procedure that cannot be too strongly condemned.

HOW LIQUID PARAFFIN SHOULD BE TAKEN

Now that the use of liquid paraffin is officially discouraged, as it has to be imported from abroad, we may remind our readers that many people who take paraffin overdo the dose and are rewarded by audible borborygmi. The B.P. 1932 dose is ½–1 oz., but if paraffin is taken regularly as an intestinal lubricant one or two teaspoonfuls night and morning is generally sufficient; this adds up to a total of two to four quarts in a year, if Sunday is observed as a dies-non for drug-taking. Its value as a laxative increases with the viscosity which depends on its specific gravity and this in turn on the size of the molecule. The B.P. gives limiting values of C_{16} H_{34} and C_{21} H_{44} with gravities of 0·880 to 0·895, but a product of sp. gr. 0·890 is to be preferred and this is less likely to leak. Leakage can also be avoided by taking paraffin in the form of jelly or emulsion, making sure first that this contains no other laxative, unless that is expressly desired. Attention should also be paid to the proper time to take paraffin; usually it is best taken night and morning, with warm milk if seepage occurs. It generally acts better if taken apart from food. Though it is established[4] that absorption of foodstuffs is not impaired by the use of paraffin, there has long been a suspicion that the regular consumption of paraffin may have a deleterious effect on the intake of fat-soluble vitamins, because of its capacity to take them into solution and carry them unabsorbed out of the body. This would be specially unfortunate when paraffin is used to replace olive or other oil in salad dressings and mayonnaise. Experimental evidence on the matter was however scanty, although Olaf Andersen, for instance, found[5] that paraffin given to humans with large does of vitamin A greatly increased the intestinal excretion of this vitamin. Moore had suggested[6] that it was carotene rather than vitamin A itself whose absorption was thus prejudiced, and later Curtis and Kline demonstrated[7] that the blood carotene level was lowered when 20 c.cm. of liquid paraffin was taken before meals. Recent work from the Arizona agricultural experiment station has now confirmed[8] by reliable criteria that the absorption of vitamins A and D, and possibly also of E, is hindered by the presence of liquid paraffin in the gut. When rats were fed on a diet of natural foodstuffs not very rich in fat-soluble vitamins, the addition of paraffin reduced the liver reserves of vitamin A and lowered the birth-rate and survival-rate of the offspring. The liver reserves of dogs were affected in the same way. A similar result was obtained for vitamin D. When rats and dogs were given a diet to produce rickets, the dose of cod-liver oil needed to protect them from rickets had to be increased about three-fold when paraffin also was given. But while the evidence is thus quite definite, it is certainly not true that all the fat-soluble vitamins are washed out of the body by liquid paraffin; if sufficient of them is given the body will obtain enough in spite of wasting a good proportion. It is well known that rats will assimilate enough fat-soluble vitamins for their needs when given in paraffin and with no fat whatever in the diet. The moral is then that if liquid paraffin is being taken the supply of fat-soluble vitamins must be generous and that the paraffin should not be taken along with food.

3. Taplin, G. V., Jacox, R. F. and Howland, J. W. *J. Amer. med. Ass.* 1940, **114**, 1733.
4. Leigh, A. J. quoted in *Lancet*, 1930, **2**, 992.
5. *Hospitalstidende*, 1938, **81**, supp., 29.
6. Moore, T. *Biochem. J.* 1929, **23**, 803.
7. Curtis, A. C. and Kline, E. M. *Arch. intern. Med.* 1939, **63**, 54.
8. *Tech. Bull. Ariz. agric. Exp. Sta.* March, 1940, p. 373.

THE RICKETTSIAS FURTHER SIMPLIFIED

GRADUALLY order is being established in our knowledge of the many infections caused by the rickettsias. Lewthwaite and Savoor[1] have shown conclusively that the scrub typhus of Malaya is identical with the tsutsugamushi disease of Japan. More recently they[2] have been able to prove that the mite fever of Sumatra is also identical with the Japanese disease. Tsutsugamushi is thus obviously a widespread infection in the Far East and since it was the first to be described its name should take precedence over such terms as mite fever, scrub or rural typhus. Alexander, Mason and Neitz,[3] working at Onderstepoort, have now thrown fresh light on the various typhus-like infections met with in South Africa. In order to compare the types of rickettsias found in that country they obtained the organisms from the blood of a dog with a febrile reaction, from ticks (*Hyalomma aegyptium*) found on a hare (*Lepus saxatilis*), from the blood of a patient with tick-bite fever, from rats, and from ticks (*Rhipicephalus sanguineus*) collected from dogs in Tunis. The morphological, staining and growth characteristics of these various rickettsias were compared, as were the experimental diseases in the guineapig, rat, mouse, rabbit, dog, sheep and ox. Rat typhus could be maintained in the guineapig and rat but not in the sheep, dog or mouse. The rickettsias from the ticks of the hare could easily be passaged in guineapigs, but those from dog ticks in Tunis and from the human case of tick-bite fever produced constant reactions in guineapigs only when cultures from the chorio-allantoic membrane of the developing chick embryo were employed. Finally, cross-immunity tests were carried out in guineapigs. These showed that murine typhus immunised against itself and to a great extent against the other four rickettsial diseases. The four other strains, however, produced reciprocal cross-immunity, but did not immunise against murine typhus. The rickettsias thus fall into two groups. In the first is the murine or rat typhus which appears to be identical with that seen in Europe and the New World. The other four strains from South African tick-bite fever of man, from dogs in Tunis and South Africa, and from the ticks on the South African hare are all closely related and probably identical. The question of nomenclature thus becomes important. Since the term tick-bite fever has become well established in South Africa it is difficult to replace it either by the French name "fièvre boutonneuse" or by the American "Rocky Mountain spotted fever." Alexander and his colleagues therefore suggest that these three conditions should all be included in the spotted-fever group while for the causative organism of South African tick-bite fever they propose the name *Dermacentroxenus rickettsi* var. *pijperi* in honour of Dr. Pijper of Pretoria who is the pioneer in investigating the rickettsial diseases of man in South Africa. This departure in nomenclature renders certain additional

1. Lewthwaite, R. and Savoor, S. R. *Lancet*, 1940, **1**, 255, 305.
2. Lewthwaite and Savoor, *Brit. J. exp. Path.* 1940, **21**, 117.
3. Alexander, R. A., Mason, J. H. and Neitz, W. O. *Onderstepoort J. Vet. Sci.* 1939, **13**, 119; Alexander and Mason, *Ibid*, p. 25; Mason and Alexander, *Ibid*, pp. 41 and 67.

modifications necessary: thus the name *D. rickettsia* var. *conori* is suggested for the rickettsia causing fièvre boutonneuse in North Africa and the Mediterranean zone. Further, the generic name "Rickettsia" cannot be allowed for what are at present called *Rickettsia ruminantium*, *R. bovis*, *R. ovina* and *R. canis*. Since these rickettsias of ruminants and the dog differ both morphologically and biologically from those of the typhus-spotted-fever group, the separation is well merited. The differences in morphology can be easily appreciated by a comparison of the photomicrographs illustrating Alexander and Mason's papers with that given by Schulz [4] in his communication of the discovery of *R. ovina* in South Africa. It is questionable also whether the rickettsias of Australian and American Q fever should not be placed in a separate genus. The general name "rickettsia" and "rickettsiosis" could however be retained since all would obviously be specific genera of the family Rickettsiaceæ.

ASPIRIN ON TRIAL

IN 1937 the citizens of the United States consumed 5,143,672 lb. of aspirin.[5] This works out at 48 five-grain tablets per head of population. If we assume that American infants took a negligible amount, adults must on an average have taken rather more than one aspirin tablet every week, and it is safe to assume that the taste for aspirin here is much the same. Yet recent work has shown that knowledge of the possible harmful effects of aspirin is far from being complete. After taking it patients often complain of heartburn and epigastric discomfort presumably because of liberation of a small quantity of salicyclic acid in the stomach by the gastric hydrochloric acid. Douthwaite and Lintott [6] have shown by gastroscopic studies that particles of aspirin lying on the mucous membrane of the stomach may produce irritation resulting in local hyperæmia and even submucous hæmorrhage, but they deliberately allowed the particles to come into contact with the gastric mucosa. The physician usually prescribes aspirin to be taken after food, and the foodstuff exercises a protective action. Douthwaite and Lintott point out that "if taken after food or with milk, it probably has no deleterious effect." They have also shown that calcium aspirin (which is much more soluble than ordinary aspirin) causes only slight gastric irritation, and there is a good case for recommending that patients suffering from diseases of the stomach should use this or one of the other neutral aspirins when aspirin would normally be indicated.

Various constitutional upsets have also been attributed to aspirin from time to time. Prickman and Buchstein [7] say that aspirin hypersensitiveness is the most common form of drug allergy; they emphasise the disastrous effects of aspirin on sensitive subjects and urge special caution in asthmatics with nasal polyps, and people who have a family history of allergy. They are able to quote four instances of severe reactions among asthmatics which ended fatally. The potential dangers of almost any drug are such that we should not be unduly impressed by rare untoward reactions, and it is not surprising that an allergist should be emphatic about the ill effects of some drugs that the general practitioner regards as eminently safe. Opinions differ, moreover, as to the incidence of aspirin hypersensitiveness. Gardner and Blanton [8] have reviewed the histories of 467 private and hospital patients more than half of whom were asthmatics; they agree that dangerous and even fatal reactions may occur in sensitive persons and advise full precautions in allergic subjects; but they add that not more than 2 out of 1000 are susceptible to aspirin, and violent reactions are even less frequent.

The lot of analgesics is not a happy one. Comparatively recently the corpses of acetanilide and amidopyrine were laid to rest. And now laboratory pharmacologists are beginning to make sepulchral references to the toxicological possibilities of phenazone and phenacetin. Practitioners are justified in defending the humble aspirin, for it remains one of the most useful drugs in their dispensaries.

4. Schulz, K. *Ibid*, p. 287.
5. *Drug and Cosmetic Industry*, 1938, **43**, 27, quoted by Prickman and Buchstein.
6. Douthwaite, A. H. and Lintott, G. A. M. *Lancet*, 1938, **2**, 1222.
7. Prickman, L. E., Buchstein, H. F. *J. Amer. med. Ass.* 1937, **108**, 445.
8. Gardner, E. and Blanton, W. B. *Amer. J. med. Sci.* September, 1940, p. 390.

DYSPHAGIA IN CARDIOVASCULAR DISEASE

THE barium-filled œsophagus is now recognised as of the greatest value in cardioscopy,[1] but there is still little available information as to the effect on swallowing of pressure on the œsophagus from enlargement of the heart or great vessels. In a well-known textbook of differential diagnosis the only cardiovascular causes of dysphagia mentioned are aneurysm of the aorta and dysphagia lusoria, due to compression of the œsophagus by congenital anomalies of the great vessels. This question has now been investigated by Bloomfield [2] who points out that there are five cardiovascular lesions which may produce, or at least be associated with, dysphagia—dilatation of the left auricle, pericardial effusion, aneurysm of the aorta, dissecting aneurysm, and such congenital anomalies as right-sided aortic arch, double aortic arch, and aberrant right subclavian artery. Of these by far the most common is aneurysm of the aorta, and particularly of the descending aorta. Even so, dysphagia is rare in this condition compared with dyspnœa due to compression of the air-passages. Bloomfield points out that severe, persistent dysphagia in a patient with an aortic aneurysm is often of grave prognostic significance, since it may indicate either a false aneurysm or a threatened rupture into the œsophagus. In dissecting aneurysm dysphagia is probably common but is overshadowed by other more distressing symptoms, though Bloomfield suggests that in the differential diagnosis of coronary thrombosis and dissecting aneurysm the presence of dysphagia supports the latter. Reports of dysphagia in patients with pericardial effusion are rare, but when this symptom is present it probably means that the effusion is a large one, for it requires a considerable degree of pressure to compress the œsophagus enough to interfere with deglutition. So far as enlargement of the left auricle is concerned it is only in cases of what Bramwell [3] describes as "aneurysmal dilatation of the left auricle" that one would expect much pressure on the œsophagus. In the course of routine screening of patients with mitral stenosis gross distortion of the œsophagus as a result of pressure from an enlarged left auricle is often seen, but in only a few is there any delay in the passage of barium down the œsophagus, and a very small minority of these complain of any difficulty in swallowing. Bloomfield records such a case, in which dysphagia was a prominent symptom and concludes that in this instance the dysphagia was probably due to œsophageal spasm secondary to pressure by the enlarged left auricle. This question of the extent to which dysphagia is due to direct compression or to spasm of the œsophagus deserves further investigation, for in spasmodic cases therapeutic relief should not be impossible.

1. See Evans, W. The course of the œsophagus in health, and in disease of the heart and great vessels. *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 208. 1936.
2. Bloomfield, A. L. *Amer. J. med. Sci.* September, 1940, p. 289.
3. Bramwell, J. C. and Duguid, J. B. *Quart. J. Med.* 1928, **21**, 187.

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Special Articles

ANXIETY NEUROSIS*

By G. W. B. James, M.C., M.D.Lond., D.P.M.

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Among the nervous casualties of the last war were many cases with rather mysterious physical symptoms which were eventually correlated with anxiety. During the years which immediately followed the term "anxiety neurosis" passed into common medical use; in fact anxiety neurosis is now in danger of replacing the neurasthenia of the early nineties as a polite portmanteau for almost any mental disease. Some psychiatrists have abandoned the struggle for clarity by grouping different conditions under the heading "anxiety states." In the textbooks the terms "psychoneurosis" and "neurosis" are used, if at all, in a conflicting manner, and one of the latest adopts an entirely new terminology and gives the neuroses and psychoneuroses a fresh description under "merergasias."

In his original paper Freud (1895) clearly set out the symptoms of anxiety neurosis, which included general irritability, an anxious state of expectation, acute anxiety attacks, and what he called anxiety equivalents, which are the somatic symptoms of the neurosis—disorders of the heart's action and of digestion and respiration, tremors and shuddering and so on. He also mentioned vertigo and the development of various fears, which he confined to those concerned with common physiological dangers (fears of snakes or fire, for instance) and fears about locomotion—for example, fear of collapse in the street or an inability to walk unaccompanied. The description is constantly confirmed in practice, but the discussions of the last forty-five years have been so focused on the ætiological aspect of Freud's paper as to put his admirable clinical account of anxiety neurosis in the background.

I am using the term neurosis as meaning a condition presenting mental and physical symptoms for which no organic cause can be found. The word "anxiety" in connexion with neurosis is short for *morbid* anxiety. Anxiety is associated with many conditions of body and mind; it is closely allied to the emotion of fear and the instinct of flight or escape, which can be looked on as normal and fulfilling an essential biological function. Similarly one may speak of normal anxiety; for example, it is normal to feel anxiety if the savings of a lifetime are involved in a financial crash over which one has no control, and such a phrase as "I am anxious to catch the 6.15" is a matter of common speech. Both examples clearly suggest that uncertainty about loss of both the savings and the train arouses the unpleasant emotional feeling that we all know as anxiety. Perhaps one may express anxiety as an emotional state closely allied to fear, accompanied by numerous somatic sensations and aroused especially by situations in which uncertainty and insecurity are prominent.

Anxiety is also seen in certain cardiac diseases, in some states of delirium, in acute and chronic epidemic encephalitis, and as an equivalent or post-paroxysmal phenomenon in some epileptics. It is experienced by patients with phobias (unreasoning fear of cats or inability to cross a bridge, for instance) and in compulsive thinking and acting or obsessions. In my opinion these are better classed as psychoneuroses, with mental causes accessible only to special methods of investigation and incidentally requiring much experience and skill for their successful treatment.

* Based on a paper read at a meeting of the Medical Society of London in April, 1940.

ORIGINS OF THE ANXIETY

Freud originally said that the anxiety of anxiety neurosis was due to sexual excitation without adequate outlet or gratification, and pointed out the frequency of morbid anxiety symptoms in engaged couples, in widows and in partners practising coitus interruptus. He made it appear that frustration of instinctive activity can give rise to anxiety, with its somatic symptoms; as if the instinctual tension, aroused and then denied outlet, found its way into the viscera in some unexplained way. This conception of frustrated instinct as a source of anxiety has always seemed to me useful and practical; but there seems no reason to confine it to the sexual instinct. It can surely be extended to the three groups of inherited behaviour patterns or instincts with which man is endowed—the herd instinct, the sex instinct and the instinct of self-preservation. Conflicts between these instinctive groups include the common one between sex and the requirements of the herd, and the special soldier's conflict between self-preservation and the herd dictates of discipline, patriotism and duty.

In anxiety neurosis the patient's physical and mental symptoms are accompanied by the manifestations of morbid anxiety either in localised attacks or as a constant emotional state. The essential ætiological factors are to be found in his life situation and can be summarised as the result of frustration of, or conflict between, instinctive needs. His account of his condition is often focused on his somatic symptoms; there is a curious lack of interest in the psychic or anxiety element of his story. As a result the examiner may easily miss the emotional factor altogether and the patient is treated for organic disease. The outpatient departments of our hospitals are full of anxiety neurotics, many of them adequately treated by the traditional bottle of medicine. Others, who are not so successfully and easily dealt with, make an extensive tour of the special departments and finally arrive with a bulging dossier of notes at the department of the hospital psychiatrist, whose task is rendered formidable by the chronicity of the condition. One may also be misled by the patient insisting that his condition dates from an infection, an operation or an accident, when in fact these are but secondary factors. Of the infections, influenza is especially hard-worked.

Case 1.—A man of 39 complained of insomnia, palpitations, and crippling attacks of "nerves." He was tremulous, irritable, unable to make up his mind and was on sick leave from his service. He dated his symptoms from an operation for dental extraction undergone after his arrival at home from tropical service three months before. Inquiry elicited the confession that he had taken too much alcohol for some months before his return home. On the surface it looked as if residence in the tropics, alcohol and the dental operation were the principal ætiological factors. At later interviews, however, it was revealed that he had had cause to fear infidelities on the part of his wife, to whom he was devoted. This marital situation was cleared up by frank discussion with both parties and the anxiety symptoms disappeared.

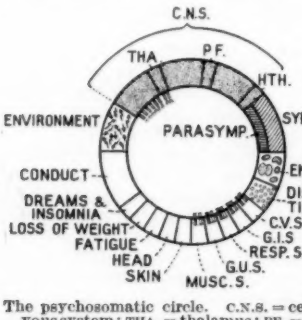
Case 2.—A married woman of 25, pregnant with her first child, fell down a flight of steps in her house. She was put to bed and recovered well. Soon afterwards she began to develop tremulousness, rapid pulse and an unreasoning fear that her baby would be an idiot. On inquiry it appeared that her husband's grandmother lived in her house and took up a great deal of her time and attention, being somewhat senile. The young woman had, not unnaturally, wished that the old lady might die. She felt such thoughts to be wicked and began to fear that an unnatural mother would produce an unnatural child.

Among 21 cases diagnosed as anxiety neurosis, taken serially from outpatient practice at St. Mary's during 1939, there were 11 females and 10 males. The youngest was 19, the eldest 42. They gave the following conditions as the origin of their symptoms: illness, 2; operations, 2; accidents, 3; bereavements, 2; unemployment

or other economic factors, 2; pregnancy and childbirth, 3; the remaining 7 either made no statement as to the cause of the symptoms or said that they had no idea what could have caused them. The onset of the symptoms was sudden in 9 cases and gradual in 12; 8 out of the 21 turned out to have underlying sexual difficulties; 4 had chronic economic troubles and 2 might be regarded as suffering from communicated herd anxiety as a result of the outbreak of war.

THE PSYCHOSOMATIC CIRCLE

Ross (1923) says that the complaints in anxiety neurosis comprise "all the sensations which the human body is capable of feeling and all the ideas a sane mind can entertain." The figure illustrates not only the groups of somatic complaints but also the conception of the anxiety neurosis as a vicious psychosomatic circle which, once started, acquires a momentum of its own.



The psychosomatic circle. C.N.S. = central nervous system; THA. = thalamus; PF. = prefrontal area; HTH. = hypothalamus; DIST. V. & TISS. CH. = distal vascular and tissue changes; C.V.S. = cardiovascular system; G.I.S. = gastro-intestinal system; G.U.S. = genito-urinary system; MUSC. S. = muscular system.

It begins in the environment by some threat, real or imagined, to an instinctive need, which may be sexual, economic or even national. The environmental factors are appreciated and reacted to by the central nervous system. The autonomic system is next shown (sympathetic and parasympathetic). Then come the endocrine glands of which the adrenals, pituitary and thyroid are of special importance. Changes in distal vessels and tissues are illustrated, because the chemistry of the tissues is altered by autonomic impulses (Kerr, Dalton and Gliebe 1937). We then come to the various somatic systems and symptoms arranged in order: the muscular system, the head as a whole, bodily fatigue, loss of body-weight, dreams and insomnia. We return to the environment by way of various disturbances of conduct, and the whole cycle begins again. So far the figure shows a one way roundabout. But autonomic impulses pass back into the central nervous system from the viscera. This is illustrated by sympathetic and parasympathetic guns, situated in the somatic part of the circle, which bombard the central nervous system with autonomic bullets.

SYMPTOMATOLOGY

The commonest complaints are of palpitations and precordial distress amounting to pain; palpitations and tachycardia are so common that the pulse may be taken in many early cases as a guide to the severity of the anxiety state. Pulse-rates of 100, 120 or more are not uncommon and the cardiac symptoms may be so severe as to lead not only to secondary phobias about dropping dead, but to consultation with a cardiologist in the belief that heart disease is the cause of the condition. The cases of disordered action of the heart which occurred in the last war were not recognised for some time as being emotional in origin. Cassidy (1934) notes that 30% of heart cases seen in consulting practice were what he describes as neuropathic. Whishaw (1936) points out that many patients believing themselves to have heart disease are of the anxiety type and often give a misleading history of infection, such as influenza, operations or accidents. He stresses the dangers of making a diagnosis of heart disease and the necessity for early diagnosis and treatment of the anxiety element. He considers that 10% of cases consulting a doctor for heart symptoms are neurotics.

Gastro-intestinal complaints embrace indigestion, flatulence, constipation, diarrhœa, mucous colitis and something which may be compared to the epigastric sensation experienced by epileptics just before a major attack, variously described as a "boiling sensation," or a feeling of "being on fire" or "full of lumps." Out of the 21 anxiety neurotics in my own series 9 complained of this phenomenon. Other symptoms are capricious appetite, loss of appetite or attacks of hunger. Salivary loss may also be complained of, so that the patient says his mouth is dry and he cannot get his food down. Nausea is fairly common, but vomiting unusual. The most common respiratory complaint is shortness of breath on effort which may amount to a "fighting for air" in acute anxiety attacks. Asthma may be regarded as partly due to anxiety. An unusual symptom is a fixed and immovable pain in the chest, generally on the left side.

The genito-urinary system is rich in anxiety symptoms. Frequency and urgency of micturition are most common, but less usual is retention or even anuria after an acute anxiety attack, or a period of great emotional stress as in war. Other frequent symptoms here are impotence, ejaculatio præcox, spermatorrhœa, dyspareunia and disturbances of menstruation.

The muscular system shows tremors or trembling; in some cases like the war anxiety neurotics it is so severe that the patient will shake his bed and even the floor of the ward. Rheumatic pains are not infrequently complained of and many backaches in both men and women have anxiety as a cause. The tremors may increase when in company and it is common to find a patient complaining of tremulousness and trembling when attending outpatient departments. Associated with the tremors is a general muscular rigidity.

There is an almost invariable complaint of sweating, either confined to the hands or general, especially at night. Blushing or local flushings of the neck or chest, dermographia, patches of "piebald" skin or leucodermia, and "eczema" are common.

For convenience the head is placed separately in the anxiety circle. The usual complaints are of headache, a band round the head, occipital pain or pressure often associated with an "agonising" pain in the neck, frontal pain or pain behind the eyes and sometimes unilateral headache. Pain in the head was complained of by 13 of my 21 outpatients; in 5 it was frontal, in 3 behind the eyes, in 1 in the neck; 1 complained of a thick head, 1 of pressure on the head, 1 of "something inside the head," and 1 said that the head was muddled. Some complain of thoughts racing in the head as if driven by machinery. Ocular symptoms include inability to read for long as the print becomes blurred, spots before the eyes and photophobia. Aural complaints usually consist of buzzing or throbbing in the ears; intolerance of all noise is very common and suggests a true hyperacousis. One woman dated her symptoms from an acute anxiety attack precipitated by the noise of rifle and artillery fire heard during the exhibition of a film. From this time her symptoms led her to avoid all noise, so that she could not listen to wireless or take her dog out lest he should get involved in a fight. Giddiness, a common complaint of the anxiety neurotic, is specially associated with locomotion; the environment keeps steady but the patient feels he or she is about to fall. Many patients will complain that they walk crooked tending to fall to the left or the right.

Fatigue is constant but erratic. It is purposive fatigue for certain chosen activities.

One of my patients was unable to carry on with his work in a factory, collapsed at work with what he called complete exhaustion, and finally lost his job. But he could cycle from his home to St. Mary's and back—about 30 miles. This man was an old anxiety case from the last war, and finally took over all the domestic work of the house and the care of the three small children and sent his wife out to work. Both of them have found it a satisfactory arrangement and it has continued for over twelve years. The man works hard from early morning to late at night without undue fatigue.

Loss of weight is general, especially in long-standing neurotics, the chief reasons for it being capricious appetite, irregularity of meals, loss of sleep, an increased metabolic rate, sweating and occasionally extra exercise taken in the hope of obtaining sleep. It increases the patient's anxiety by supporting his fears that he is

gravely ill. Old-standing cases sleep moderately well, early cases always present sleep disturbances. The insomnia is usually of the type in which the onset of sleep is delayed; less often it consists of early waking. In both types the sleep is disturbed often by anxiety dreams, which may be described as "horrible" or "terrifying" and wake the patient in a state of panic. Many of these dreams are concerned with ideas of death, accidents or indefinable situations of illness; others exhibit frustration as their principal theme.

A man of 35 dreams almost every night of a cross roads, well-known to him; he is on a bicycle and as he approaches he sees a small knot of people, with police and ambulance men. Bodies with covered faces lie on the side of the road and a policeman walks towards him with uplifted arms, in an effort, the patient concludes, to stop him seeing some revolting sight. At this point his bicycle begins to side-slip and he finds he is riding over a patch of blood. He begins to fall and wakes with a fear that he is going to be drowned in blood. The frustration type may be illustrated by the recurrent dream of a woman of 25. Her dream starts in her own bedroom where she is engaged in packing clothes in a trunk. For some reason it is very urgent that her trunk should be ready quickly, but it is impossible to finish the packing. Either there are piles of garments left over, or the trunk cannot be shut. She wakes in a state of mild panic.

The terrifying dreams of the anxiety cases in the last war often dealt with battle scenes, some of them actual events experienced during the soldier's active service; others, equally real, were experienced by men who had never been engaged in active fighting or even exposed to shell fire. Several of my cases have had terrifying dreams of bombing raids since the outbreak of war.

DISTURBANCES OF CONDUCT

The patient will complain of an inability to concentrate, of forgetfulness and often of a growing inefficiency at his work. He may be irritable at home; the children become a burden and their noise unbearable. Secondary phobias develop, the commonest being a belief that he is going to become insane. Acute anxiety attacks, with fainting or inability to stand or walk, induce the fear of sudden death. These ideas lead to seclusiveness, an avoidance of company, sudden rushes into the street for air or for a long walk; some anxiety patients are found wandering with loss of memory. Primitive racial fears are sometimes prominent, fear of the dark, of fire, of lightning, of knives, of animals like snakes, rats, or birds. Reflection on this unhappy condition will start all sorts of phantasies to explain it; and so the anxiety circle is recommenced. A family man will often worry over the fate of his children, fearing an "insane" father must necessarily produce insane offspring. A woman fears that she should never have married, and dreads the marital embraces of her husband lest idiot children should be born to them. Some patients have a restless desire for constant occupation and distraction, saying: "I am all right so long as I am doing something." Such occupations are seldom carried out efficiently and are repeatedly changed.

Has the anxiety neurotic any justification for his fears of insanity? In my 21 outpatients one woman came from a mental hospital, where she had been sent for investigation; none of the others is known to have become insane or to have required admission to a mental hospital.

Dr. Prideaux of the Ministry of Pensions has very kindly allowed me to see the manuscript of an unpublished work, from which it appears that out of 356 pensioned anxiety cases from the 1914–18 war, only 4 can be traced as having shown evidence of becoming psychotic up to 1937; 1 committed suicide, 1 was found drowned and 2 developed melancholia.

Ross (1936), in a survey of neurosis treated at the Cassel Hospital, states that about 50 patients out of 1186 have become insane, but his cases were not all anxiety neurotics in the limited sense in which I have here described the condition.

Acute anxiety attacks often involve loss of consciousness and collapse in the street.

Mr. Blank, aged 22, a professional player of games, fainted twice at a registry office during his wedding to 20-year-old Miss Blank. He swooned once after saying "I will," and again when the bride made her declaration, and he had to be helped out when the wedding was over. That is a typical acute anxiety attack on an obviously healthy young male; and there is no mystery about the instinct concerned.

Physiologically these episodes seem to be sudden sympathetic attacks with a devastating sensation of panic which often leads to a clouding or loss of consciousness.

The problem of anxiety neurosis in soldiers will certainly arise again during this war. It is useful to recall that the ætiological factor is fundamentally the conflict between the instinctive drive of self-preservation and the herd drive of duty and discipline. Mira (1939) in a paper on psychiatric experience in the Spanish War of 1936–39 describes a severe malignant type of anxiety case to which he gave the name psychorrexis. A few days after admission to hospital these patients showed pyrexia, a black ulcerated tongue and facial twitchings; many died. Fatal cases of anxiety were not recorded in the 1914–18 war, as far as I can ascertain, and these cases described by a psychiatrist of experience therefore possess a special interest at this time.

TREATMENT

Psychotherapy.—The array of therapeutic measures used in the treatment of anxiety neurosis range from neuro-surgery to the patent foods and medicines advertised in the press. Little special psychological training is necessary to detect some frustration or conflict in the three groups of instincts, and the psychotherapy required consists of a methodical and courageous inquiry into the history and circumstances of the patient. This extended history or medical biography has been dignified by the term psychobiology by Meyer and his pupils. Some patients undoubtedly require skilled psychotherapy, especially young adults, whose anxiety symptoms are fired by latent homosexual trends. But psychotherapy cannot be the whole answer to this problem, if only on account of its magnitude. If we take Halliday's (1935) figure of 30% of insured sick persons as suffering from some form of neurosis, and Cassidy's figure of 30% of heart cases seen in private consulting practice as being "neuropathic" in origin, we easily arrive at astronomical figures for the total neurotic sick of England, Scotland and Wales. In 1938 there were approximately 1½ million fresh outpatient attendances in Greater London, excluding children's hospitals and certain special hospitals. It would be reasonable to say that a fifth of those patients had emotional factors underlying their complaints, giving 300,000 neurotic patients in London. Certainly a total of a million sufferers from anxiety conditions would be an understatement for the British Isles. Ten thousand skilled psychotherapists would have to work hard to deal with such a figure in a year. The ideal is for every doctor to become his own psychotherapist, and if he will learn to become his own psychobiologist he will have gone part of the way to attain this ideal. Admittedly it takes time, patience and practice to elicit a full history, but it is remarkable how quickly skill and speed are acquired both by the doctor and his patient.

Drugs.—Unfortunately the patient often takes alcohol to relieve anxiety; I need not dilate on its undesirability. Sedatives and hypnotics like the barbiturates are useful, and an outpatient should always be given sleep if insomnia is a prominent symptom. My own experience favours Medinal or Allonal as hypnotics, with a small dose of bromide or Sandoptal (isobutyl-allyl-barbituric acid) in tablet form if an anxiety attack threatens, especially when away from home. Ström-Olsen and McCowan (1934) report favourably on prolonged narcosis in 7 anxiety cases. I have experience of a single case treated with insulin, a young woman whose anxiety attacks were so severe and led to such disorder of conduct and thinking that a provisional diagnosis of schizophrenia had been made. The anxiety attacks were relieved and she remains well after a year. Somatic symptomatic treatment should not be neglected. The bottle of medicine can be made to do a great deal.

Anxiety being in the main associated with sympathetic visceral changes, it should, in theory, be possible to find substances either to depress the sympathetic or stimulate the parasympathetic. Many substances have been tried, the most successful being the acetylcholine derivatives, the clinical effects of which have been estimated by Jones (1936) and favourably reported on by Misch (1935). My own experience is mixed; the usual story is that the tablets worked wonders at first, but that their effect was temporary. Bellergal, a mixture of Bellafoline, ergotamine and barbitone, is sometimes successful.

The surgical method of Moniz (1936) consists of partial destruction of both frontal lobes, with section of the prefrontal fibres on their way to the thalamus. Moniz applies this technique to psychotic rather than neurotic anxiety; he notes the disappearance of anxiety after the operation, either from failure of the brain to transmit stresses into the autonomic or an inability to appreciate anxiety by reason of loss of the critical functions of the frontal lobes.

Endocrine therapy.—Freud considered that coitus interruptus was a fertile cause of anxiety. Preparations of glands of animals of the opposite sex have been used with some success. Unfortunately mixed preparations have been given, so that one cannot say precisely what extract has been of benefit. I have no adequate experience of the administration of testosterone or theelin. Thyroid extract should be avoided; there is an increase in the basal metabolic rate of many anxiety neurotics. Occasionally anxiety is diagnosed as thyrotoxicosis, and a partial thyroidectomy is performed with disastrous results (Whishaw 1937, Jones 1937).

Any local sepsis requires treatment in the neurotic as in the healthy. Sepsis may lower bodily health and encourage frightened thinking about the body, so that the threshold of anxiety is lowered and symptoms, normally compensated, appear.

SUMMARY

In the ætiology of anxiety neurosis, environmental factors involving frustration of or conflict between instinctive needs are of primary importance.

The mechanisms and symptomatology of the anxiety neurosis can be pictorially presented as a vicious anxiety circle.

Treatment consists of a systematic attack on that circle.

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HYSTERIA REVIEWED

IT is normal to want to get out of a tight or otherwise uncongenial place; the hysteric manages to do it by exaggerating normal protective mechanisms. Dr. Alexander Kennedy, in an analysis of the origin and prognosis of recent hysterical states [1] describes them as a flight into activity, non-realisation or incapacity. We all know the flight into activity, of which Nero provided the classic example: the anxious performance of some trivial task as a means of avoiding direct realisation of a disaster. The hysteric is able to prolong this defence beyond normal limits. Flight into anger is a variant of flight into activity, which again we all know from experience; the man who snaps at the office-boy because his chief has annoyed him is employing it, and in war it has obvious uses. Again, it is common not to grasp the full meaning of a disaster at once; the hysteric prolongs this momentary bewilderment into twilight states and stupors or loss of memory. Non-realisation may subsequently be replaced by some more permanent protective symptom (the flight into incapacity), the patient emerging from a twilight state to find himself under the wing of a brand-new disability such as aphonia, paralysis or forgetfulness. He does not recognise that his symptom has taken him out of the arena and granted him that freedom from responsibility which is the privilege of the invalid. Kennedy finds that the amount of anxiety accompanying the symptom is a useful guide in assessing the prognosis. Normal anxiety is present when a man prepares to take a decision or face a situation; if the decision is not surely made his state of conflict is perpetuated, and the pathological anxiety produced is most severe when the conflict involves the instincts of self-preservation, reproduction, or the herd instinct with its complex codes of honour and duty. One way in which a hysteric can escape his conflict is by taking permanent refuge in an incapacitating symptom, accepting the limitation of his life which it involves, and deliberately regressing to the dependent state of a child. When this happens the famous *belle indifférence* appears and the outlook for recovery is poor. The man who is not willing to accept a dependent state has a better chance of recovery; anxiety is among his symptoms though he may conceal or deny it, or it may be masked as aggression. The prognosis also depends on the degree of stress to which the patient has been subjected and on his powers of adaptation to the ordinary demands of life in the past. Kennedy considers that however phlegmatic a man may be circumstances can arise to cause him anxiety past bearing; variations in resistance are wide, but everyone is a potential hysteric.

1. *J. Ment. Sci.* September, 1940, p. 988.

The clinical appearance may be the same whether the patient is a previously normal man who has taken temporary refuge in a disability under an extreme strain, or a man in the process of developing chronic hysterical invalidism. The patient who has a past history of competent endeavour has a better prognosis than one who has led an aimless life with no central interest or ambition. Hysteria develops more readily, too, in those with a native handicap, whether it is a physical disability or a poor or abnormal mentality. The chronic hysteric is facile, childish, self-important and shallow, but these characteristics may also appear in the recent hysteric and may alter with relief from strain. "In the patient's interest" Dr. Kennedy says "he must be seen at his best." He urges that treatment and investigation should be intensive until it becomes certain that chronic hysteria is inevitable, after which the aim can only be to improve the patient's adjustment to life without hoping to alter him. He finds that relatively few cases of recent hysteria become chronic and that only a small number of these become complete dependants. The ultimate prognosis is not too bad—for the patient. Lifelong neurosis will be less of a handicap to him than to those on whom he is dependent.

Treatment aims at allowing the patient to gain insight into the origin of his condition and to readjust himself in the light of that insight. Patients showing acute reactions often need very little help, except to be steered away from further retreat when the symptoms subside. Kennedy considers that incapacitating symptoms must be removed early lest the habit of invalidism develops, and this to some extent directs the order of treatment. It falls naturally into the stages of rest and reassurance, removal of symptoms and therapeutic exploration. The symptoms of all cases of recent hysteria would probably disappear if the patient was removed from the situation which caused them; but as the mere removal of symptoms is not the object of treatment, rest and reassurance are only useful as preliminaries, and to allay the exhaustion which usually contributes to states of non-realisation. If anxiety—showing itself as nightmares, somnambulisms or anxiety attacks—is prominent the patient will benefit by prolonged narcosis, as Mira found. As soon as rest has improved his resistance it is necessary to remove the symptoms. If possible this is done by persuasion rather than suggestion; the patient is "seen frequently and allowed to discuss his condition

until he develops insight with as little interpretative interference as possible." If, however, he appears likely to cling to his symptoms, a few dark hints should be dropped, giving the impression that cure is inevitable and that the doctor can produce it when he likes. With some symptoms which form a barrier between doctor and patient—such as aphonia or amnesia—suggestion may be necessary from the start; hypnosis may provide a rapid and convenient way of dealing with them. Where persuasion has been tried for some time and has failed suggestion of an impressive kind may be necessary. Kennedy advises the physician to become formal and distant, seeing the patient seldom and briefly and letting him feel that his cure is certain. When he seems sufficiently impressed a date is fixed and the symptoms are removed by simple demonstration and re-education, or by whatever method of suggestion seems most appropriate to the case. But, as Kennedy repeatedly points out, removal of symptoms is not the cure of hysteria; the patient must be allowed to gain insight into their causation and this is the last and most important phase of treatment. As he gets a clearer view of the facts the patient often finds himself faced with a decision, and he will try to get the doctor to make it for him. If he is to make a full recovery it is essential that he should get no advice; he must make his own decisions. And when he develops a decided attitude to his problems he is getting fit to return to normal life.

In England Now

A Running Commentary by Peripatetic Correspondents

"LOOK in any time you're passing," said my patient over the telephone. "No hurry." A day came when I found myself in his neighbourhood with an hour to spare so I turned into the main road that passes his house. It is a twisty thoroughfare that runs gently downhill for a mile or more, and mindful of petrol restrictions I turned off the engine, slipped into neutral, and hugging the lefthand ledge freewheeled along at a mere 25 miles an hour. Rounding a blind corner I was disconcerted to see the road entirely occupied by two large cars side by side less than a gunshot away, and rapidly approaching. I applied my brakes. The silly ass at the wheel of the outside car tried vainly to cut in again across my bows, and in front of his neighbour. The inevitable happened, and we collided head on. We all three stopped, two of us for obvious reasons, the third out of charity. Water cascaded from our telescoped radiators and blood from my forehead. The opposing driver (curse him) was unhurt, but his passenger had a scalp wound and was so concussed that he didn't know his glutei from his olecranon (as they say in the Army). A passing ambulance took him to hospital and set me down at my patient's house where, my wounds having been dressed, I was given much cherry brandy and an excellent lunch. There is something rather satisfactory about being involved in a car smash in which one is only slightly injured and not at all to blame. To hear the police making sympathetic noises while I made my report was (to me) a rare and refreshing experience. Indeed, were it not that my little car—and incidentally my trousers—are damaged beyond repair I should have no regrets.

* * *

". . . Could two of the nurses appear as lady's maid and kitchen maid for the health drinking scene and in bright dresses at the Farm House wedding scene? Can you get a bit of wire to hang up mistletoe in the centre of the stage for the last scene? I also want a best man; he just sits beside the bridesmaid and walks out with her at the end . . ."

Variety is the spice of life and amateur theatricals are full of surprises. We are accustomed to all sorts of unusual requests and set out happily enough to seek the necessary volunteers. It will not be difficult to secure willing maids, but the best man may be more elusive. Most nice men seem to shrink from this sort of thing; the young house-officer of today refuses to take a chance until he has seen the bridesmaid. But we shall get one before Saturday, for the show must go on. During the winter months we aim at securing for the entertainment of our patients two evening concerts apart from one film show (provided from our own welfare fund), and occasional afternoon talks, more or less topical. For the evening shows we are largely dependent on the good offices of a central county organisation that provides amateur artistes, the hospital supplying such petrol coupons as may be necessary for their transport. The concert parties that come to us are of varying hues and qualities. Some are visitors at regular monthly intervals and can be counted on to maintain a high general level of performance—songs, violin solos, sometimes a bit of conjuring, occasionally a much-appreciated dance band. Others, though well-meaning, are not quite so happy, and our patients have developed a technique of their own for dealing with shows that do not appeal to them; they do not hesitate to leave the meeting and once or twice the house has been embarrassingly thin before the close.

We have experimented in the production of concerts by the patients themselves. The advantages of patients' concerts are that they may ultimately entertain and that they may keep the patients busily engaged for many hours at rehearsals. That at all events is the theory, and our first concert of the type was a great success. It was schooled and fathered by an officer patient, whose talents lay that way and whose only disadvantage was a tendency to do things rather in the grand manner. The show was good though the knocks were hard; there was a matron full of recognisable mannerisms, if a fondness for punch; a lady resident who would study patients' eyes in preference to their feet; and a physician who seemed to answer to "get them up quick, Peter." Our second essay was not so fortunate. It was sponsored by a lad whose entertainment value was rather less than he thought it was and his troop lacked the sparkle of the first, though the show was noisy enough. The same crowd wanted to give a second performance a day or two later but fortunately it was possible to send the ringleaders away to an auxiliary hospital before it was too late. By comparison nurses' concerts are quiet and seemly, with a fine sense of decorum.

* * *

Sometimes our entertainments take the form of plays by amateur organisations from neighbouring county towns, or by a professional party from the repertory theatre twenty miles away, sometimes a surprisingly successful unsophisticated performance such as an exhibition of dancing by young children. We are occasionally fortunate enough to have a visit from an outstanding personality of the stage, and for a time we have had a series of afternoon talks on a variety of subjects all based on recognition of the fundamental truth that what our patients need is not so much education as recreation. These talks have been catholic in scope and have dealt with mountaineering, Turkey, the Highlands of Scotland, the garden of Eden, science and the war. One learned knight, who came to talk about nothing in particular, introduced a miscellaneous collection of stories with a tale about a nurse of his acquaintance who in some campaign had bestowed upon her by the Emperor of Siam the Order of Chastity, third class; he went on to define the female of "bachelor" as "a lady in waiting." But the highlights of our entertainment world are undoubtedly the ENSA concerts that descend upon us like manna from heaven at three or four weeks' intervals. No beating up of audiences is required for these affairs, for the concerts are invariably well received if occasionally embarrassing for some of the staff, who have found it prudent to avoid the front row since a ponderous blonde made a threatening descent on them from the platform. One of our most lingering and pleasant recollections of that evening is of our senior surgeon, respectably married, shifting uneasily from foot to foot and assuming the pinkest of pink blushes in the fear that the worst might befall him, what time the anæsthetist with his usual high sense of propriety presented a haunted, worn expression from recognition that he could not edge his chair away sufficiently far from the threatened area.

Every concert brings its vote of thanks and it is one of our constant efforts to induce other members of the staff to assume a duty for which no-one has much enthusiasm. Sometimes the performance throws up an incident that serves as a peg for the few necessary

sentences, but often these descend to pious platitudes. It is particularly difficult to keep on paying suitable homage to regular visitors and in these circumstances a colleague's administrations can be doubly blessed. After the concert, tea and sandwiches for the artistes—lemonade for the more juvenile—and a chat that tries to make it clear to them that we really do appreciate their efforts, for there can be no doubt that our patients look on these concerts as landmarks in the hospital week.

* * *

Looking back through my diary I find that Trafalgar Day 1939 was spent in an atmosphere of the sternest endeavour. Among other activities I examined 100 pairs of feet for flatness and their attendant legs for varicose veins. I also injected their owners with T.A.B. and tetanus toxoid. In the evening England expected me to attend a troops' dance in the Drill Hall which was crammed to suffocation and hot as Gehenna. Included in the company was a wide-eyed baby lying in its mother's arms staring at the jazz band, in full swing only a few feet away, and apparently undismayed by the surrounding racket. To this party I had invited any members of the nursing staff of the local hospital who cared to come and six of them turned up. To find partners for the whole convoy proved an impossible task, but they all liked gin and cigarettes. With vigour, if not with skill, I danced with each in turn in the strictest rotation and took them all home at the end vowing to myself that never again would I be a squire of dames. Over a final drink in the mess I learnt something of silver foxes from an expert. It seems that they are hard to tame and rarely inspire affection but if they escape and run wild they become twice as fleet as the red fox and no pack of hounds can keep on terms with them for longer than a quarter of an hour. Altogether an eventful and instructive day not to be repeated.

* * *

I went on a life-saving night call last week. Over the telephone a voice said would I go at once to Mrs. Johnson who was "blooding at the nose like two taps turned on"? Stop hæmorrhage at all costs, thought I, being still imbued with a course of first-aid lectures I had been giving. Dashing off in a pyjama-jacket, pumps and no socks, I motored four miles in record time to find the farm completely shut up. I saw at once it must be the other Mrs. Johnson who lives equally far from me in the opposite direction. Eight more miles and I found another dark and silent farm. However, I knocked them up. "Mrs. Johnson?"—"They've moved to Langway." This is the most isolated farm in my district, but off I went. The road got worse; it was pitch black and the hedges met above the car which was tossing about like an invasion barge on a dirty night. Going up a steep hill, I stuck. The lane was so narrow that I couldn't open the door to get out, but I gathered I had taken the wrong turning. I had about a mile and a half to back, and towards the end, with my neck nearly screwed off, the wheels went round and round in the mud and I stuck again. Unable to move either forward or back, I abandoned ship and all immediate hope of finding the farm and set out to walk home. Dawn was breaking as I arrived with bleeding feet. "You've been a long time," said my wife, "was it very serious?" When I said I hadn't seen the case yet she laughed heartily. I took her car, and blue in the face and gasping for breath arrived at last at Langway. They looked a little dazed at my apologies. "Us hasn't sent for darcter." I asked if they knew some more Johnsons, and they managed to recall some "out Changford way," but they didn't think I tended they. The farmer stroked his unshaven chin and said brightly, "Can't be anything serious for certain." I went home and had a bath followed closely by a brain-wave. The first Mr. Johnson, I thought, had left his farm to telephone and I had arrived before he got back. But it was no good. The first Mr. J.'s daughter received me with more blank looks. "Dad heard a car in the middle of the night and said 'twas the military. I spect 'twas you." I gave up the struggle and went home to breakfast. At morning surgery there was a message inviting me to visit Mrs. Thompson who had phoned in the night. Needless to say the bleeding had stopped, and as a point of non-medical interest she hasn't paid her bill since 1929.

There is a lot of psychology in our everyday speech. Take for instance the difference between "listening to" and "listening for." Before the end of the battle of London it may make a lot of difference to the minds of many. We cannot help hearing the noises overhead, but when we do it is much better that we should not start listening to them instead of getting on with our work or going down into our dug-out, but it is when we start consciously listening for them that we are on the way to crack. Subconsciously, perhaps, we are always doing so even when asleep: that may be why when a car accelerates we think it is an air-raid warning. Those cars which have a note resembling the siren remind us how nearly related the psychology of attention is to the physiology of hearing. It is when someone listens for an overhead noise and, having heard it, listens to it to distinguish whether it is ours or theirs that he is beginning to suffer from the battle. Whether his treatment should be in the hands of the psychologist, the neurologist or otologist is not today a matter of moment, for Harley Street is not in commission. Fortunately there is still the G.P. It is a tiresome thing trying to decide whether a given explosion is a bomb or a big gun; this is best decided by having a bomb burst fairly near. A number of people have had the best night for weeks after this has happened. Probably, without realising it, they have been wondering what all the explosions mean. Once they have had a bomb near them they know subconsciously (and in their sleep) that all the other bangs are merely gun-fire and do not warrant their attention.

* * *

Our village is collecting scrap iron. A large heap, which was getting larger every weekend, has appeared on the village green. This has the advantage that all the rubbish in the village is now collected in one spot. We no longer fall over pieces of bedstead, or become entangled in old hoops while on a country walk. I expect the scrap heap also has advantages for the Minister of Supply, but he will lose them if he doesn't soon arrange for its collection. The village children and the evacuees have discovered that one roller skate is an efficient method of transport and that an old wheel makes a good hoop. Pieces of stout wire can be put to many uses and old tin cans make good drums. In fact the scrap iron is rapidly disappearing into the village again, but instead of lying neglected in ditches and lanes it is finding a place among the treasures of the cottage children.

* * *

When that animal which was to become man first emerged from the sea, paused for a few million generations in the neutral sludge between the tides, and scrambled at last to the hard, unyielding dryness of the land, he probably carried with him a yearning for the element that had been his home since he was amœbic. Just as his structure still has remnants of his marine nursery days, just as his habits still show a tidal rhythm, so deep down in the strata of his affections is a love of the sea. Once I knew a man from the Hebrides who got a good job with prospects in the middle of Queensland. He chucked it up after six months, he was getting ill. He'd never been away from the sea before; he longed for it; he heard it breaking in his dreams; and it was the most primitive appeal of all, except one, that finally broke him down—the insistent call of the senior cranial nerve, the smell of fish.

So in this ship, in spite of her manifold vexations, the noise and the smell and the foul air at nights, there come times of deeper receptivity, at dawn, after a drink, and sometimes suddenly without obvious cause, when one looks out over the face of the sea and feels at one with it and at peace. Sometimes I have got the same sort of feeling with a person of one's own blood, neither of us talking, but perfectly happy in each other's company. I find my mind groping for a phrase. "Peace that passeth understanding" obviously won't do, for that is just what we are trying to do to understand it. "The peace of sameness," "the harmony of similar structure," something like that. Or perhaps we should employ a more hackneyed simile—the sea, our mother, whence we came, and incidentally to whom we have quite a sporting chance of returning.

Parliament

THE principal item of business in a quiet parliamentary week has been the introduction and passage through all its stages in the House of Commons of the bill to prolong the life of the present House for a year.

Mr. HERBERT MORRISON, the new Home Secretary, was really pushing an open door when he appealed for general support for the measure. Members of all parties fully realise that a general election in the midst of a world war is impracticable. Mr. Morrison made a statement with the authority of the Prime Minister intimating a carefully considered decision which had been arrived at by the Government. An appeal to the electorate must always remain the final constitutional method of resolving the grave issues of national policy. No-one could foresee what circumstances would arise, but it would be the desire of the Government when a general election became practicable to give sufficient notice for the creation of a new register, and that interval would also afford the House of Commons an opportunity to consider questions connected with changes in our electoral policy.

While giving general assent to the principle of the bill there was a disposition on the part of some members to embark upon a discussion of electoral questions, such as a redistribution of seats and the like, but this was cut short by a ruling on the part of the Speaker that these subjects were out of order on a one-clause bill which was confined to the specific purpose of prolonging the life of the present Parliament. The debate, however, was not entirely sterile. Mr. LEES-SMITH expressed the hope, which was very widely shared in the House, that the precedent of 1918, when an appeal to the country was made three weeks after the Armistice, would not be followed at the end of this war.

HOME FOOD-SUPPLIES

Mr. ROBERT HUDSON, Minister of Agriculture, in a statement on our agricultural position, gave the House a reassuring picture of the contribution which the home farmers are making to our national food-supply. The ploughing of an additional 2,000,000 acres increased food production and the number of cattle, particularly dairy cattle, had also been enlarged. We were entering on the second winter of the war with considerably increased reserves of meat. British agriculture was in a well-balanced condition and able to face the demands which next year's campaign would make on food production. Mr. ERNEST BROWN, Secretary for Scotland, in winding up the debate for the Government, said that it was the official policy that milk production must come first. Although it was true that milk production had decreased as a result of last year's hard winter there was good reason to hope that an improvement would take place this winter. He assured the House that the aim of the Government was to secure a maximum of food production required to maintain the health of the nation in war-time. In recent years a great deal of thought had been given to problems affecting the health and strength of the nation, especially on the side of nutrition. Scientific opinion was agreed that among the vital requirements were bread, milk, potatoes, oatmeal, vegetables, and fats. Meat, while desirable, did not fall into the category of vital foodstuffs. No scientist imagined that a nation could be kept healthy merely in terms of calories. Regard must be had to other things and first of all to the habits of the people and the foodstuffs they liked, as well as the things which scientists said were good for them.

SUMMER-TIME IN WINTER

Mr. HERBERT MORRISON gave great satisfaction to the country when he announced that summer-time is to continue throughout the winter.

QUESTION TIME

Evacuation of London Hospitals

Mr. R. W. SORENSEN asked the Minister of Health whether he would consider removing certain hospitals and patients in London and other dangerous areas to places of relative safety.—Miss HORSBRUGH replied: Arrangements have been in operation since the beginning of the war by which a large part of the ordinary work of the London hospitals has been carried on in the outer hospitals, and at the present time the great majority of the acute sick are being treated in outer hospitals. Some hospital beds must be maintained in London in order to deal with casualties and urgent sickness or accidents. The Minister does not at present consider it necessary that comparable arrangements should be made for any other area although he is watching the position. It must be remembered that the hospital accommodation outside the main towns is limited and the beds must be kept clear in the outer hospitals for casualties and service sick.

Later in answer to a question on the evacuation of the old and infirm Mr. M. MACDONALD said: My officers have been in touch with those of the London County Council on this matter for some time and although the difficulty of finding alternative accommodation without prejudicing the interests of the acute sick and of casualties is very great, I have already arranged to move some of the aged and infirm from London hospitals, and hope to arrange to move a large number more very shortly.

Control of Food Prices

Mr. J. MCGOVERN asked the Parliamentary Secretary to the Ministry of Food if he would take steps to fix the price of all essential articles of food and impose penalties for any breaches owing to the substantial increases which had taken place since the outbreak of war; and if he was aware of the discontent among persons of low incomes such as old-age pensioners, and men and women with large families, due to the high prices and varying prices in different areas.—Major LLOYD GEORGE replied: Price control has already been instituted over a wide range of essential foodstuffs, and further commodities will be controlled as and when desirable. It is the constant concern of the Minister to endeavour to provide adequate supplies of essential foodstuffs to the public at reasonable prices, and in some cases subsidies are paid for that purpose.

Vitamins in High-extraction Flour

Mr. G. MANDER asked the Parliamentary Secretary whether, in view of the fact that white bread is very largely deficient in vitamins, and was very often baked with alkaline bleaches, thereby destroying what vitamins remained, he would consider the advisability of arranging for the supply to the public of highly extracted bread enriched with yeast and added vitamin concentrates.—Major LLOYD GEORGE replied: Bread made from high extraction flour is freely available to meet public demand, and the Minister does not consider it necessary to add to the vitamins already present in such flour.

Health in A.R.P. Shelters

In answer to a question Mr. HERBERT MORRISON said the medical officers of health of the metropolitan boroughs were requested in September last to arrange for the regular visiting of public air-raid shelters. The visiting of such shelters (including underground stations used as shelters) by medical officers of the Ministry of Health has also been in progress and is being further developed and systematised. In answer to a further question he added that arrangements for the employment of additional doctors are not yet complete.

Venereal Disease

Captain G. S. ELLISTON asked the Minister of Health if the grant to local authorities of 75% of their war expenditure on venereal disease included expenditure on education and propaganda.—Mr. MACDONALD replied: The grant which I announced in the House is payable towards the capital and maintenance costs of new treatment facilities necessitated by war-time conditions. I have got questions of education under consideration.

Soldier's Mental Condition

Mr. D. L. LIPSON asked the Minister of Labour whether medical boards give attention to the mental health of the men registered for military service in view of the fact that a mental defective had been graded A.1 by a medical board.—Mr. ERNEST BEVIN replied: The investigation of a man's mental condition is an important part of the examination by medical boards and is a matter on which they have recently received further directions on the recommendation of the medical advisory committee under Lord Horder's chairmanship. I am inquiring into the case mentioned.

Letters to the Editor

SAFEGUARDING SLEEP

SIR,—In your leading article of Oct. 19 you say that "Noise alone does not keep people awake once they have had a little time to recognise that it has no importance for them." Although this is true to a large extent it is not entirely applicable, especially to those of intellectual pursuits. Their sleep is rarely undisturbed, and even in peace-time they are awakened by noises, particularly those of human origin, which have no importance for them. However, this does not affect the main issue that we should do everything possible to eliminate the exhaustion, irritability, and loss of efficiency caused by loss of sleep. In this our profession can lend appreciable help to the effort of winning the war. Officially the only aid which has been offered is the distribution of ear plugs, and, I understand, the issue of aspirin for use in air-raid shelters. Advice to keep the plugs clean and to avoid exchanging them with other members of the family has been omitted. Meatal eczema and boils will result. In fact, even when the greatest care is exercised, the repeated use of solid, or semi-solid, ear plugs leads to these troubles. Clean wool soaked in medicinal paraffin, or impregnated with Vaseline, seems to be harmless.

Aspirin is seldom effective as a soporific, it produces irritation of the gastric mucosa in 80% of people and is not devoid of the danger of addiction.

Most of those we have now to help are normally good sleepers and my opening quotation certainly applies to them. Our task is not strictly comparable to that of treating peace-time insomnia. As you write, it is a matter of taking the edge off anxiety and giving the highly strung (a group which is rapidly increasing) tranquillity and self-confidence. Often we find, therefore, that a rapidly acting and rapidly destroyed drug will ensure a full night's rest. Once an individual has been helped to sleep well in spite of gunfire and bombs often he finds that his power of natural sleep has returned. For the majority, however, some soporific is needed and should be given nightly or every second night.

We have a wide choice of drugs. The ideal preparation should be non-cumulative, of low toxicity, devoid of "hang-over" effects and of propensity to addiction. Such a drug has yet to be found but we have neared the ideal in the urea derivatives—the barbiturates and carbromal (Adalin). Dr. Harris in THE LANCET of Oct. 12 states that most people can take gr. 30 of sodium bromide thrice daily quite easily and this does not leave them with a heavy head in the morning. I will join with Dr. Ling in disagreement with this view, especially if the implication is that such a dosage may be repeated daily. The bromides provide the typical example of cumulation due to slow excretion. This is occasioned by the body's inability to distinguish between bromides and chlorides. Thus a dose of gr. 90 of bromide in one day will require several weeks for its complete elimination. With further medication the stores of this halogen will mount up and such paradoxical toxic symptoms as insomnia, delirium, and hysterical manifestations may arise and possibly end in death. At the least one will expect severe acne and such mental torpor as will render the individual quite unfit for his daily tasks. Gillespie (*Lancet*, 1934, **1**, 337) after a painstaking search of available literature concluded that up to the end of 1932 danger to life from *therapeutic* doses of the barbiturates had not been proved. No reasoned refutation of his critical review has been forthcoming although there can be little doubt that the use of these preparations has increased in the intervening years. Allowing that idiosyncratic reactions do occur, probably in less than 3% of individuals, yet those are usually skin rashes and pyrexia and are not fatal. Should they arise the safe carbromal (excluded from Poison Rules 1935) should be tried. In fact the drug may well be used in the first place, for although it does not produce weight for weight the depth of sleep of the barbiturates it usually suffices for air-raid insomnia. It would be invidious to mention the drugs for which I have preference. No preparation should be chosen which contains amidopyrin. Different barbiturates must be tried out tentatively until the best one is found for each patient. No conclusions can be reached from mere consideration of chemical structure.

My last point is that in therapeutic doses these drugs do not produce such a degree of torpor as to render a person incapable of responding promptly to an emergency. A bomb in the near vicinity, a smell of burning or of explosive, will act like a complete antidote, with the added advantage that once the danger is over refreshing sleep will obliterate the memory of a moment's terror.

Harley Street, W.1 A. H. DOUTHWAITE.

SIR,—I am glad you support so unequivocally the use of barbiturates to obtain sleep and peace during air raids, but I am mystified why you should suggest giving a quick-acting barbiturate like soluble barbitone in small doses three times a day to ensure sleep, for this seems to me to give the maximum of sleepiness during the day and the least chance of effective action at night. Phenobarbitone is rather a different matter as it is clinically much more slow-acting, but in each case I should strongly favour giving the whole dose at night when the maximum sleep-producing action will be obtained, and with phenobarbitone a definite sedative action will be noted on the day following. It seems important that these drugs should be given with a hot drink for rapid action, and some people vary very much in their response even when they take it in this way. In a fairly extensive experience of these drugs over 10 years I have not met any case in which there has been any difficulty in stopping their use when desired. Indeed I have been struck by the number of patients who used to attend for all sorts of ailments who now merely require one of these tablets at night, as their other ailments no longer seem to trouble them.

Winsford, Cheshire. W. N. LEAK.

ASCORBIC ACID AS AN INDEX OF NUTRITION

SIR,—Dr. A. T. Todd in THE LANCET of Sept. 14, referring to my paper on the vitamin-C levels of schoolchildren, asks in effect three questions. (1) Is it certain that scurvy is in fact caused by an insufficiency of vitamin C? (2) Shall we continue to make this substance the sole criterion of dietetic adequacy? (3) Does it really matter if the intake of the vitamin is below the reputed optimal requirement?

(1) It has been repeatedly demonstrated that in scurvy the past diet is deficient in vitamin C, and that the disease can be prevented or cured by vitamin C. It is hard therefore to escape the conclusion that scurvy is a deficiency disease. The suggested analogy between scurvy and vitamin C on the one hand and malaria and quinine on the other is surely false. In malaria an infective agent is at work, whereas in scurvy only a deficiency is known. Perhaps the underlying difficulty is that which has been referred to by Hopkins—the natural bias of the human mind to prefer a "positive agent" to a "minus sign." It is true that Szent-Györgyi once propounded the theory that a second factor, the hypothetical vitamin P, was involved in producing a scurvy-like syndrome. But other laboratories —including later Szent-Györgyi's own laboratory—have been unable to confirm his original experiments, and, as he himself has put it, there must have been some unexplained discrepancy.

(2) Has anyone ever in fact suggested that ascorbic acid should be "the *sole* criterion of dietetic adequacy"? In my paper the very first paragraph specifies "direct tests to determine precisely the level of nutrition as regards each of the several important dietetic essentials." Past work published from this laboratory has been concerned with detecting deficiencies of a number of these factors, including vitamins A, B_1, C, &c. In suggesting a programme for nutrition surveys as long ago as 1936 (*Lancet*, 1936, **1**, 966) I pointed out that tests had become feasible to ascertain the levels of nutrition with respect to iron (hæmoglobin levels), calcium and phosphorus (blood analyses), as well as vitamins A, B_1, C, D (e.g., phosphatase test) and so on.

(3) The third question raises the whole fundamental issue of partial deficiencies. To this day the tacit assumption still seems to be made by some that provided a man is not showing symptoms of beri-beri or scurvy he is therefore having enough vitamin B_1 or C. But there is a wide gap between the amount of the nutrient needed for protection against blatant avitaminosis and that needed to ensure optimal health. Numerous feeding

experiments on children of the kind Dr. Todd calls for have already been done, and have left no doubt about the improvement in health when suitable additions are made to ordinary working-class regimens. To give all the evidence concerning partial deficiencies is not possible in a letter, but I have summarised some of it in an article in this issue. The assembled nutrition experts of the world, under the auspices of the League of Nations, have defined the daily requirement of vitamin C as 30 mg. per day. This is approximately the amount which has been found necessary to stay a fall in capillary strength in juveniles, or to cure incipient scurvy in sailors. By the saturation test we are able to measure the reserves of vitamin C and say how far below or in excess of the optimal standard a given subject may be, or whether he is approaching dangerously near the level of scurvy. Apparently Dr. Todd believes that the amount of 30 mg. arrived at by the international experts is wrong.

The two arguments produced by Dr. Todd for lowering the generally accepted requirement are (*a*) that in Arctic regions raw seal or walrus flesh is protective, and (*b*) that Rietschel, Schick and Mensching in Germany were able to keep men on a diet low in C for relatively long periods. Both these facts are simply explained. Raw meat if eaten in large quantities gives a reasonable supply of vitamin C. There are examples of its use in polar and other expeditions, and during the last war it was successfully used when alternative antiscorbutics were not available. As to Rietschel and his co-workers we should not be misled by the attempt of certain German writers to persuade their public that their existing standards of nutrition are needlessly high, and that vitamin C is an unnecessary luxury. Rietschel has been answered by Stepp and other physiologists in Germany who have pointed out that "no scurvy" is not the same as "optimal health."

It need occasion no surprise if saturation tests for vitamin C, and tests for other deficiencies, show that an appreciable proportion of the population is below the optimal standard. This is to be expected, bearing in mind the independent evidence reached along other lines (cf. p. 539) about the incidence of malnutrition. It would be a dangerous policy to let reserves sink to zero, on the mistaken assumption that health need not suffer until scurvy appears.

Nutritional Laboratory, Cambridge. LESLIE J. HARRIS.

DEATH AND DYING

SIR,—Professor Ryle in his beautiful essay corroborates the conclusion, which many well-known members of our profession have reached, that the act of dying is usually not in any way so terrible to the dying individual himself as it seems to his friends present at the death-bed.

I referred to the prevailing medical evidence in my "Aspects of Death" and quoted the supporting opinion of such eminent men as Sir Henry Halford, Sir Benjamin Brodie, Sir William Gull, Sir W. S. Savory, Dr. William Munk, Sir William Osler, Sir J. F. Goodhart, Prof. H. Nothnagel, Prof. C. A. Ewald, and I would now add Sir Frederick Treves, Prof. A. E. Hoche, and Prof. G. Perthes. Dr. T. B. Scott (1914) went so far as to write: "The so-called agony of death is, in my experience, a chimera." Dr. M. O. Raven's letter (*Lancet*, Oct. 12, p. 468) leaves me rather indifferent, for I feel compelled to hold that a civilised adult man's sense of duty—and his actions—should not be dependent on whether he believes or not in personal immortality or is agnostic—a question often regarded still as supremely essential for every human being. I am not sure that Dr. Raven and many others are justified in representing Socrates as a convinced advocate for human personal immortality, for (according to Plato's "Apology") after his condemnation to death he said to those of his judges who had voted for his acquittal that he did not regard death as an evil. Death, he declared, must be one of two things: either it was complete annihilation, in which case it was like a dreamless sleep; or else it was a change and migration of the soul, in which case he would have the delight in the other world of meeting and conversing with the just judges and heroes of former times, who would not condemn him to death for questioning them; to a good man nothing could come as an evil, and even death might be a blessing. Surely, Socrates would have agreed with the agnostic sentiment on T. H. Huxley's tomb, that it is well "even if the sleep be endless." I think Socrates would also have enjoyed the substance of Professor Ryle's essay.

Harley Street, W.1. F. PARKES WEBER.

INFANTS IN DAY NURSERIES

SIR,—In his letter of Oct. 12 Professor Parsons deals with the disadvantages of day nurseries especially for infants under nine months. The Birmingham Day Nursery campaign committee recognise these drawbacks and in a circular letter on Sept. 19 they pointed out that the infant under six months is better under the care of its own mother; they much regret that mothers are forced into industry by economic circumstances before the baby is six months old. My experience in general practice shows that the nursing mother is treated with scant sympathy by the approved societies, and sick benefit which would in many cases be sufficient to keep her at home is denied her. In the case of the soldier's wife Professor Parsons must surely realise that the Government allowance is not sufficient to give mothers and children a diet which is not lacking in some of the essentials for good health, and therefore naturally the mother will seek work to supplement this allowance. While the Government is asking more women to enter industry we must at least guarantee that their children shall be given skilled care, a proper diet, and the best possible conditions. Professor Parsons might be convinced of the shortage of women's labour by the following statement made by the local welfare officer: "There is a shortage of women workers in Birmingham and there will shortly be a campaign to get more women into the factories." My committee is convinced that under present conditions day nurseries are as essential to the welfare of the children as any other public service.

M. H. BARROW,
Hon. Sec., Birmingham Day Nursery Campaign Committee.

SIR,—Professor Parsons in your issue of Oct. 12 emphasises some extremely important points. As men are called up they will have to be largely replaced in industry by women. Recently I have examined 1000 women replacing men in a highly skilled job demanding a good standard of health and ability. Of the first 100, 80 are married and 20 are single, and their ages range from eighteen to fifty. They had 59 children between them, the youngest being aged six months. Women of the child-bearing age such as these will have to take an increasing share in the war effort, and it is a matter of national importance and urgency that their children should receive expert care.

Many women when they apply for work ask their employers about nursery facilities for their children when they are at work. Employers are willing to give time off for the woman to make arrangements for the care of her child, but private arrangements are unsatisfactory and the woman has either to give up her job or ask for further days off to make fresh arrangements, and this inevitably causes dislocation in our vital national industries.

With reference to breast-feeding, in peace-time 33% of failures were stated in the Birmingham maternity and child-welfare report of 1938 to be due to anxiety on the part of the mother. In war-time this proportion will increase. With regard to infection, it will be interesting to see whether "bombs or bugs," take the greater toll of life. Here again the young baby would in my opinion be safer under expert care in a proper nursery where defects and illnesses can be quickly spotted.

In total war the child is in as much danger as its father, and the anxieties of the mother have much increased. It seems clear, therefore, that if women are to take their place in industry they can only do so if they are assured that their children are well cared for and happy. The school-children are occupied at school all day, but a necessity exists for more play centres and communal feeding. More nursery schools are required for the toddlers, and nurseries of all kinds in easily accessible places, with well-trained staffs, possibilities of isolation, and so on to meet the needs of the baby, and all this at a cost the mother can afford out of her wages, if industry is not going to be impeded by lost time. For these reasons the establishment of well-equipped nursery schools, and residential and day nurseries is an urgent necessity.

Birmingham. DOROTHY BRENNER.

SURGERY OF DYSMENORRHŒA

SIR,—Perhaps the unsatisfactory element in the treatment of dysmenorrhœa is due to non-recognition of the fact that it is a symptom and not a disease. If this symptom has an organic basis cure will follow the removal of the cause; without this organic basis local treatment is a thing to be avoided at all costs, and I for one am rather sceptical of the long cervices, small uteri and the rest of the minor abnormalities said to warrant treatment. One meets similar cases with no dysmenorrhœa. It is to be hoped that the medical profession will withstand the pressure constantly exerted by anxious mothers who consider gynæcological treatment necessary for young daughters who complain of dysmenorrhœa. If it is desirable to investigate such a case let it be done under anæsthesia, and let us do all we can to prevent the girl's attention from becoming focused on her pelvic organs. These cases are caused by maladjustment, misunderstanding of sex matters and a sedentary life; they need encouragement of self-confidence and a healthy emotional outlet. Congenial occupation and cheerful companionship will help and the A.R.P. services are probably playing their part in the removal of dysmenorrhœa. On the physical side gymnastics and dancing will probably prove as effective as a curettage and much more lasting in their effects. Even now one frequently meets the suggestion that these girls should "try to get married to see if it will help." The happiness of the unfortunate husband is unlikely to be brought about by a marriage entered upon as a cure for dysmenorrhœa; moreover, if the patient considers matrimony in the same light as a dose of medicine it will probably fail as a cure. A love match is a different pair of shoes and devoutly to be wished; nature, after all, is the most efficient remover of inhibitions.

Kensington. VIOLET RUSSELL.

LUMBAR PUNCTURE IN CEREBROSPINAL FEVER

SIR,—I was much interested in the paper by Williams and Brinton which appeared in your issue of Oct. 19, and I suggest that the diagnostic lumbar puncture done in their cases had a therapeutic action. Probably the withdrawal of even a small quantity of cerebrospinal fluid helps, and one or two lumbar punctures may be the optimum number for a case of cerebrospinal fever treated with sulphapyridine. The following case is of interest in this respect.

A man of 26 felt unwell on Oct. 2; he had pains in the limbs and sweated and thought he had a severe cold. On Oct. 5 he returned to work, but his symptoms recurred that night. On Oct. 11 he complained of headache and stiff neck; he vomited repeatedly. Temperature was 101° F., rising to 103° F. in the afternoon. He was admitted to hospital and I saw him the same day. He had received no sulphonamides before admission, but was cyanosed and severely ill. Temperature 106·8° F., pulse-rate 126, respirations 32. Severe frontal and occipital headache. No neck rigidity, Kernig's sign absent, no rash, no photophobia. Consciousness was clouded. Immediate lumbar puncture released 2 c.cm. of turbid fluid, under pressure. Antimeningococcal serum, 65 c.cm., was injected intramuscularly. Headache relieved slightly. Immediately after lumbar puncture the patient complained of neck rigidity and developed Kernig's sign. Sulphapyridine, 3 g., was given at once by mouth and followed by 1 g. 4-hourly. Within 8 hours his temperature had fallen to 102° F. and his colour was good. Next day his headache was less severe; he had photophobia; temperature 100·4° F., pulse-rate 108, respirations 28. By Oct. 14 he was much improved; his temperature was 97·2° F. He had slight headache and no neck rigidity. His sulphapyridine was reduced to 0·5 g. 4-hourly. On Oct. 16 treatment was stopped; he was convalescent.

I think this patient would have died without the original lumbar puncture. Beaumont and Dodds[1] state that the withdrawal of 5 c.cm. of cerebrospinal fluid lowers the cisternal pressure of a normal person 30–40 mm. Harries and Mitman[2] suggest the withdrawal of a few cubic centimetres of cerebrospinal fluid as the best method of terminating convulsions in a case of whooping-cough. It would be interesting to compare a series of cases treated with sulphapyridine alone with a series treated also by lumbar puncture on one or two occasions. The difficulty of verifying the diagnosis in the cases not punctured should not be insurmountable.

Health Department, Swansea. G. E. DONOVAN.

1. Recent Advances in Medicine, London, 1939, p. 327.
2. Clinical Practice in Infectious Diseases, Edinburgh, 1940, p. 197.

ADHERENT PERICARDIUM

SIR,—I must differ from Dr. T. G. Armstrong when, in his interesting paper (*Lancet*, Oct. 19) he states that the constrictive type of adherent pericardium never occurs in rheumatism. Incidentally, "never" is a hazardous word in medicine. Many years ago at Great Ormond Street I had a boy for months under my care who after a severe rheumatic pericarditis developed the enlarged liver, spleen and recurrent ascites we associate with a constrictive pericardium. I was present at the autopsy which showed the pericardium thickened and completely adherent. The rheumatism had been definite and there was no evidence of tuberculosis. There is another rheumatic form of constrictive pericardium, the result of which I have termed the malignant form of rheumatic pericarditis—a relapsing sullen pericarditis lasting over months. A radiogram can be mistaken for one of pericardial effusion and I have seen an unhappy surgeon burrowing in the adhesions until he opened the heart. Then he stopped. A rheumatic heart enlarged by valvular lesions may also have a constricted, thickened pericardium just as a man may be buttoned up securely in a waistcoat he wore before he took to overeating.

I have seen a number of cases of tuberculous constrictive pericardium. As we know, tuberculosis may cause large and recurrent effusions, but, as Dr. Armstrong points out, may also be a blatant cause of constrictive pericardium. Cheadle taught me this in the last century. Having treated some of these cases for years, from the onset to the end, I wrote about their history in a small book "Heart Disease and Aneurysm" which with all its merits was promptly overlaid by the notable book of Mackenzie and lived but to give a few gasps.

I have no desire to be aggressive but the remembrance of the face of that surgeon seeking for an effusion and greeted by blood from the heart makes me dare to repeat that a rheumatic pericardium can be constrictive, even in the most classical sense.

Bath. F. JOHN POYNTON.

BLOOD SEDIMENTATION INDEX

SIR,—In his excellent article in THE LANCET of June 29 on the sedimentin index Dr. George Day states: "Delay between withdrawing the blood from the vein and setting it up in its column causes a much increased first-hour reading, for during this delay the corpuscles are aggregating into clumps, and, when the tube is finally set up, the maximum velocity is reached earlier." "Eureka!" I cried. "All we have to do is to leave the blood standing for a few hours, then shake it up and we have the maximum velocity of fall from the start." In actual fact this is not the case. Working on these lines I measured a number of sedimentation-rates. With part of the sample of blood I filled a 200 mm. Westergren tube, and kept the remainder for various intervals of time up to 24 hours before shaking it up, either gently or vigorously, and measuring its rate of fall. Graphs were then made of both sets of 10 min. readings, up to 2 hours, but in both cases there was an initial slow fall, followed by the maximum rate of fall, and finally a decreased rate as the cells packed at the bottom of the tube; nor was there any measurable difference between the two sets of readings over any period of the graph. After 24 hours the blood showed a tendency to clot in the Westergren tube. The importance of these findings appears to be that one may safely keep a sample of blood up to 24 hours before measuring its sedimentation-rate and still have reasonable certainty of obtaining the correct result. The temperature at which the rate is measured must obviously be constant, however.

Horton Emergency Hospital. J. S. PHILLPOTTS.

NEUROTICS IN THE FORCES

SIR,—Dr. Neustatter endeavours to dispose of my letter referring to the prevention of neurosis by the application of "some heat" and then passes on to say that there are more urgent general problems regarding current war neuroses which concern psychiatrists. I would say that there are few more urgent problems which concern the profession of medicine than the prevention of neurosis.

I suggested that in the education of the young a better state of health might be attained by successful physical education working in close association with general education. Training which will improve function and create reserves of strength, and attention to the purpose of all movements and activities, contribute to the development of people who will stand up well to all sorts of strains that may be imposed on them. I agree that all this is commonplace but how often are these commonplace but vital matters neglected.

I repeat that to strive for accuracy in sensation and in action is a good aim and will develop a mechanism through which accurate thought may be created. What can be more accurate than the achievements of the great athletes mentioned by Dr. Neustatter, and many more like them who can hit a ball almost where they want! The greatest of them by the beauty and power of their movement are a joy and inspiration to watch. How they behave in the pavilion is merely evidence of their ability to do something else. Specialisation tends to exact a price.

When Dr. Neustatter replaces my phrase of successful physical education by physical-jerks psychotherapy and when he refers to the Victorian backboard he appears to be unaware of what educationists are trying to achieve by physical education. Dr. Neustatter admits he is untidy. I too am untidy but I am not proud of it and would never claim untidiness as a "concomitant" of the best sort of health.

Sutton, Surrey. A. L. KERR.

SIR,—A psychotherapist is accustomed, though not reconciled, to finding those who have been his patients penalised for that very reason; but we have a right to expect that medical boards examining recruits for the services should show a better understanding of psychological cases than they were able to do in 1914. An ex-patient of mine has just been classified C 3 and told that he is unlikely to be called up. He is a man of superb physique, and so far as I know had no physical defect except slightly varicose veins, which had been effectively treated by injection before his medical examination. At the time when he came under psychological treatment he held a good appointment which he filled more than satisfactorily, but he was acutely depressed on account of his inability to resist an obsessional urge to occasional abnormal conduct. He had been able to conceal this from his employers and associates and would certainly not have been rejected by the Army on account of it. He is now free from symptoms, cheerful, self-possessed, an excellent mixer, and has large reserves of energy and interest; but he admitted frankly when questioned by the board that he had received psychological treatment, whereupon they postponed their decision and asked for a report from me. I gave the opinion that his recovery might be expected to be permanent and that he was likely to make an exceptionally good soldier, and he was summoned for a further interview; he did not, however, see the board again but was told he had been classified as above mentioned, by a clerk who expressed amazement at this result.

There can be little doubt that had this man received no treatment he would have been accepted for the Army, though he would have been much less likely to make good than he is now; one can only suppose that the board, unable themselves to assess his mental condition, and having little faith in any benefit alleged to have been derived from psychological treatment, think it wise to reject all men who have ever received such treatment. I suggest that a psychiatrist or medical psychologist should be asked to assist a medical board when it has to deal with such cases.

Devonshire Place, W.1. J. NORMAN GLAISTER.

HORMONE TREATMENT OF UNDESCENDED TESTIS

SIR,—Your leading article of Sept. 14 is very interesting but I feel that it is somewhat biased. I wonder whether you are aware of all the evidence contained in the paper by myself and colleagues to which you refer. Your statement that our conclusions were "unsupported by, and indeed contrary to, laboratory experience . . ." ignores the experimental work reported in our paper. Our conclusion as to the possible damage to the testis in humans following treatment with gonadotrophin was strongly supported by our well-controlled experiments in laboratory animals. In our opinion the microphotographs we published clearly showed the marked degeneration which followed in the cryptorchid testes of the animals receiving hormone, as opposed to the very slight degenerative changes noted in the cryptorchid testes of non-treated animals. Thus far I have received no dissenting comments from the many urologists and experimental biologists who are interested in this problem in this country. Regardless of theoretical considerations, I feel sure that the repetition of our experimental work by any competent person would lead to conclusions similar to those we made.

Chicago. J. S. EISENSTAEDT.

PSORIASIS UNCONQUERED

SIR,—The annotation on p. 496 of your issue of Oct. 19 leads me to recall the following case. In 1932 a shepherd, whom I had been treating for psoriasis covering the extensor surface of both forearms for a considerable time with the usual internal and external remedies without benefit, called to tell me that he had cured himself by the application of whale oil and sulphur; he showed me his forearms and I saw no trace of the skin disease. There has been no return. I have had no opportunity to treat psoriasis since then. But, thinking the cure may have been due to vitamins in the whale oil, I now add cod-liver oil to any ointment prescribed for intractable ulcers, with most satisfactory results.

Galvelmore, Crieff. WILLIAM HAIG.

BREAD UPON THE WATERS

SIR,—Criticism of the bureaucracy is a barren sport. Whether medically qualified or not, the civil servants who now control us body and soul have so perfected the art of dividing responsibility that their consciences are beyond the threshold of ordinary stimuli. Yet the hardest masters pay their servants. The officers of the Emergency Medical Service in this hospital, and presumably in others, many of whom are attempting to live on a small fraction of their former incomes, received their September salaries only today. The only excuse which has been offered, without any expression of regret, is that the Ministry of Health has moved to a well-known pleasure resort. Are they now so engrossed with the local fun fair that they cannot attend to their duties, or is an attempt to be made to starve us into acceptance of any proposals which the government may see fit to make now that our contracts have expired?

A HALF-STARVED PHYSICIAN.

An Emergency Hospital, Oct. 28.

According to statistics just published only about 4800 persons died in 1939 from pulmonary tuberculosis in Sweden, a death-rate of 0·76 per 1000 of the population. In the five-year period 1911–15 the mortality was 1·94 per 1000 and in the period 1821–30 9·1 per 1000. The old idea that consumption was far more prevalent in cities than in the countryside held good until some ten years ago. About that time the mortality curves for this disease crossed one another, and since then the cities have had a lower figure than rural districts. This is due to a more rapid improvement in the towns, and not to any deterioration in the countryside. Today pulmonary tuberculosis is most prevalent in the northernmost part of Sweden, where the death-rate is 1·52 per 1000 compared with 0·76 for the whole country.

Dr. W. Norwood East has been appointed one of the Commissioners under the Prison Act 1877.

SCOTLAND

SYNTHETIC HORMONE ANALOGUES

Prof. E. C. Dodds began his Cameron prize lecture in Edinburgh on the biological significance of the synthetic hormone analogues by surveying therapeutic methods of the past. From Galen's time until sixty years ago, he said, drugs had been derived from compounds occurring naturally in plants. After the rise of organic chemistry salicylic acid was synthesised; and later came the synthesis of acetylsalicylic acid, a compound not found in nature, and its introduction into the treatment of disease. Schafer and Oliver's discovery of a therapeutic agent in the adrenal glands and Murray's successful treatment of a case of myxœdema focused attention on the endocrine glands. Allen and Doisy's experiments with an alcoholic ovarian extract marked the commencement of the researches in which Professor Dodds had been particularly interested. For long the task of separating the active principle from the ovarian extract seemed insuperable. The discovery by Aschheim and Zondek that an œstrogenic substance was excreted in the urine during pregnancy led up to the isolation of pure œstrogenic substances by three separate workers, Marrian, Doisy, and Butenandt. The chemical structures of these substances varied and it was not clear whether the œstrogenic property was a specific action. Carcinogenic hydrocarbons were also found to be œstrogenic. The only common factor among these chemical substances was the phenanthrene nucleus, and it was thought that this was necessary to œstrogenic activity. Further experiments were carried out with unrelated compounds and one of these—*p*-hydroxy-propenyl benzene (anol)—was found to possess œstrogenic activity, which was, however, less than that of the œstrone isolated from pregnancy urine. Dimerides of anol were then investigated and it was during these experiments that three compounds were found which not only had œstrogenic activity but were at least three times as active as naturally occurring œstrone; these were stilbœstrol, hexœstrol, and a hexadiene. Although their physiological properties were similar to œstrone they were chemically unrelated to it. Clinically they were more useful as they were effective when given by mouth, more potent, and cheaper. They could be used in the treatment of symptoms arising in association with the menopause, failure of lactation, and certain forms of infantilism. The only untoward side-effect reported after their administration was nausea which was central in origin and appeared to be related to the nausea experienced in the early months of pregnancy; it occurred in only 1–2% of cases. The synthetic compounds which were most active pharmacologically—Prontosil, Salvarsan, and stilbœstrol—had a chemical relationship in the presence of two benzene rings linked in various ways. This linkage might be the fundamental factor in their pharmacological activity.

COMBINED RESEARCH IN NEUROLOGY AND PSYCHIATRY

At a recent meeting of the Edinburgh University court it was announced that the Rockefeller Foundation had made a grant to the university for the year 1940–1941 of £4500 for the furtherance of combined research in neurology, neurosurgery and psychiatry. This fund, together with other moneys which are available, will be directed by Mr. Norman Dott and Prof. D. K. Henderson who are collaborating to set up a combined neurological and psychiatric organisation. The neurology and neurosurgery unit under the direction of Mr. Dott has recently taken charge of a portion of Bangour E.M.S. hospital. The accommodation built in the Royal Infirmary a few years ago with the help of funds given by Sir Alexander Grant will now be used largely as a neurological diagnostic centre in close touch with Bangour where nearly all the operative work will be concentrated. A large team will include psychiatrists, neurologists, neurosurgeons, a worker in electroencephalography and the staffs of the usual ancillary services. Clinical material will be drawn from ordinary civil practice, air-raid casualties, and the wounded of the forces, so that the opportunities for coördinated research and therapeutic work should be excellent.

REGIONAL HOSPITAL PLANNING

Following Lord Nuffield's recent gift to provincial hospitals, representatives of voluntary hospitals from all parts of Scotland met in Glasgow to confer with members of the Nuffield Trust about the coördination of regional hospital schemes. Mr. S. P. Richardson, of the British Hospitals Association and the provincial hospitals regionalisation committee of the trust, said that the first aim was to promote the coördination of health services of all kinds, to eliminate all unnecessary services, and to see that services were adequate for the needs of the population throughout the district. The trust had no intention of interfering with the internal management of any hospital but they wished all voluntary and municipal hospitals in Scotland to be represented on the regional council so that their views might be pooled. The trustees were convinced that any step which would mean that not only voluntary hospitals but municipal hospitals were to come under one vast state organisation would be most detrimental to the public health services of the country. Alderman W. Hyde, secretary of the Nuffield Provincial Trust, said that the trustees had decided not to make donations or grants to individual hospitals. Scotland was already represented on the central medical council of the trust by Sir John Fraser and Professor Mackintosh, who had been invited to help to form a Scottish medical advisory committee; a nucleus of personnel had already been suggested. The trust proposed to place at the disposal of this committee such money as was necessary to finance the initial organisation. There would be direct contact between the Scottish and the English medical committees.

SCOTLAND'S FIRST WOMAN PROFESSOR

Dr. Margaret Fairlie was formally installed in the chair of midwifery and gynæcology in the University of St. Andrews at a graduation ceremony last week. Principal Sir James Irvine said that the use of the word "daughter" under circumstances where hitherto one had always been compelled to use "son" called attention to the fact that this was the first occasion when a woman had been admitted to a professorial chair in a Scottish university. To play the part of pioneer was no novel experience for the university which was the first in Scotland to open its doors to women students, but it was no desire for novelty that led to Dr. Fairlie's election. She had won the position by merit, by her sympathy and skill, and her zeal in imparting her knowledge to others.

UNITED STATES OF AMERICA

CIVIL SUIT AGAINST TYPHOID CARRIER

IN New York state people who are proved to be carriers of typhoid bacilli are registered and are thereupon placed under certain restrictions, so long as the carrier state persists. Last December one of these registered carriers was convicted of handling food in violation of the state law and was fined $25. A civil suit has now been brought against this carrier by an electrical engineer who asks $53,500 damages for the death of his wife from typhoid fever, contracted, it is alleged, through the illegal action of the carrier in preparing food.

SULPHATHIAZOLE

The present status of sulphathiazole in the treatment of infections was discussed at a recent meeting of the third district branch of the Medical Society of the state of New York by Dr. Charles H. Rammelkamp, assistant in medicine at the Boston University school of medicine. Sulphathiazole is more readily absorbed and more rapidly excreted than sulphapyridine. It diffuses readily into the pleural and ascitic fluids but irregularly into the spinal fluid, and therefore has not been used in cases of meningitis. In animals sulphathiazole is found to be only half as toxic as sulphapyridine and sulphamethylthiazole. In man it causes nausea and vomiting less often (a third to half as often as sulphapyridine) and when they occur the symptoms are less severe. Hæmaturia is less but drug rashes are more common. In the

treatment of pneumonia sulphathiazole appears to be as effective as sulphapyridine, so far as present experience goes. Pneumococcus types which tend to be drug-fast to sulphapyridine unfortunately are equally resistant to sulphathiazole. Some success has been achieved in the treatment of *Staphylococcus aureus* septicæmia with sulphathiazole. In most of these cases adequate surgical drainage of all the focal lesions is necessary. Bacteriostatic and bactericidal tests in vitro show the superiority of sulphathiazole to both sulphanilamide and sulphapyridine in *Staph. aureus* infections. Sulphathiazole has also proved valuable in certain infections of the urinary tract, and is indeed the only sulphonamide which has been found effective in infections with *Streptococcus fæcalis*. Blood concentrations from 3 to 5 mg. per 100 c.cm. are found necessary for maximum bactericidal and bacteriostatic effectiveness in pneumococcus and in *Staph. aureus* infections. Lower concentrations are effective in infections of the urinary tract.

BLOOD TESTS DURING PREGNANCY

Since March, 1938, it has been legally required in New York state that a test of the blood of each pregnant woman for syphilis shall be made during pregnancy or at delivery. The object of this requirement is, of course, that cases of syphilis may receive treatment in time to preserve the health of the offspring. To what extent this object has been achieved is shown by the following table derived from a study of 84,475 birth certificates, on which have been recorded the facts relative to the taking of the test, though the result of the test may not be entered on the certificate. In 41% of the cases a test was made during the fifth month or earlier.

Stage of pregnancy	Tests made	% of total
Prior to delivery	64,413	76·3
Third month or earlier	17,892	21·2
Fourth month	8,297	9·8
Fifth month	8,436	10·0
Sixth and subsequent months	27,945	33·1
Month not stated	1,843	2·2
At delivery	17,041	20·2
Prior to pregnancy	232	0·3
Test not made	2,633	3·1
Question not answered	156	0·2
Total	84,475	

When the test is not taken at all a reason must be presented on the certificate. The most frequent explanations were that the mother had no prenatal care, that the birth was unattended, and that the physician who delivered her was not the woman's regular physician. There was also a group of patients who had refused to have the test made.

DEATH OF DR. F. P. LEWIS

On Sept. 10 Dr. Francis Park Lewis of Buffalo died at the age of 85 after a medical career lasting 63 years. He was a native of Hamilton, Ontario, a descendant of American loyalists who went to Canada at the outbreak of the American revolution. He graduated from Cincinnati in 1876 and immediately took postgraduate work at the New York Ophthalmic Hospital. He studied later in London, Berlin and Vienna, and has translated many medical works on the eye from German, French and Italian literature. Dr. Lewis is perhaps best known for his work in promoting the use of silver nitrate for the prevention of ophthalmia neonatorum. At the time of his death he was vice-president of the International Association for the Prevention of Blindness organised in Amsterdam in 1931.

At a meeting of the medical advisory council of the Nuffield Provincial Hospitals Trust on Oct. 5 Sir Farquhar Buzzard from the chair said that the trustees desired a general statement of policy in regard to the coördination and development of hospital and medical services. He pointed out that it would be difficult to draw up a statement of this kind without illustrative examples, and the meeting decided that subcommittees should be set up to consider pathological services, cancer services, and accident services.

LIGHTING IN FACTORIES

THE powers of the Home Secretary relating to factories, including the power to prescribe standards of lighting are now exercised by the Minister of Labour. In September, 1938, the Departmental Committee on lighting in factories submitted their fourth report containing recommendations on standards. Up to the outbreak of war regulations embodying those recommendations had not been made, and it was then felt that they should be modified to suit war conditions. The position was reviewed by the committee, and a fifth report containing amended recommendations was submitted in June, on the basis of which the Minister of Labour proposes to make regulations. These have been published in draft [1] and any objections to them must be sent to the minister within 40 days of Oct. 15.

In a large number of factories now the work has to be done at high pressure and a great strain is imposed on the worker; owing to the prevalence of night work and overtime the hours spent under artificial light are far longer than before, even in factories where there is adequate natural light. Some factories are permanently blacked out, with the result that artificial light is in use all the time. The present conditions of work in many factories are unnatural and new to most of the workers, and in order to maintain and increase production the committee recommended a higher standard of lighting than in their previous report.

The draft regulations are intended to apply in factories where persons are working for more than 48 working hours a week or in shifts. The suggested standards provide for both sufficient and suitable lighting. The general illumination over parts of the factory where persons are regularly employed are required to be not less than 6 foot-candles measured in the horizontal plane at 3 ft. above the floor, as against the minimum of 1 foot-candle at floor level, previously recommended. Where structural difficulties prevent the uniform attainment of the standard the general illumination at 3 ft. from the floor must be not less than 2 foot-candles, and where work is actually being done it must be 6 foot-candles or as near that as possible. Over other interior parts the illumination must be not less than half a foot-candle measured at floor level. All these are minimum values; the 6 foot-candle standard is based on illumination that will enable ordinary work to be done with ease, but higher standards will be needed for some classes of work.

Other provisions aim at the suppression of glare. Where any artificial light source is less than 16 ft. above the floor no part of the source or light fitting of a brightness greater than 10 candles per 1 sq. in. must be visible to persons normally employed within 100 feet of the source unless the angle of elevation from the eye exceeds 20°; local lights for particular areas of work must have suitable opaque shades or be otherwise screened to prevent glare; and as far as possible arrangements must be made, by screening or otherwise, to prevent discomfort or injury by the reflection of light from smooth or polished surfaces into the eyes of the worker, or eyestrain due to shadows.

The committee recommended that interior walls should be kept light in colour up to 20 ft. above floor level. No such provision appears in the draft regulations, but in a covering letter from the Factory and Welfare Department employers are reminded of the value of increasing the brightness of rooms in this way. The department, like the committee, urges that as much natural light should be used as possible. Natural light even in small quantities contributes to the cheerfulness of a room. The new regulations should raise the general level of factory lighting to that prevailing in our better factories.

1. Draft Statutory Rules and Orders on Factories. London: H.M. Stationery Office. 1*d*.

If "Waterloo 3311" is unobtainable at any time applications for ambulances for cases of illness should be made to Whitehall 2177 or Waterloo 6687. Applications in connexion with street accidents and emergencies should continue to be made by dialling 999.

Obituary

HAROLD ALFRED SCHOLBERG

M.B. LOND., D.P.H.

Dr. Scholberg died at his home near Cardiff on Oct. 14 after a somewhat trying illness. As a consulting pathologist he was well known over a large part of South Wales for more than 30 years. Born in Chile of Scandinavian and Scottish parentage, he took his medical course at St. Bartholomew's Hospital where he was well liked. After graduating in 1898 he was house-physician to Lauder Brunton of whom he was an admirer. Later he became Sir Trevor Lawrence research student in pathology and he was a research scholar of the Grocers' Company. In 1903 he was appointed bacteriologist in the joint Cardiff and County laboratory, and lecturer in bacteriology at University College, Cardiff. Thus began his long association with what is now the Welsh National School of Medicine. In 1908 he became consultant pathologist to the Cardiff Royal Infirmary and a few years later he embarked on consultant practice in Cardiff. He made connexions with a large number of the hospitals in South Wales, among them the Whitchurch Mental Hospital where, with the congenial collaboration of Dr. E. Goodall, he did his best work chiefly on the pathology of mental disease. Although fortune led him into a busy consultant practice his heart remained true to research. He had a keen intellect and was deeply read in scientific subjects both within and outside of medicine, and he was in every way suited to the academic career which never quite became his lot. For the rest he gave himself unstintingly to the work of developing the school and although he shunned prominence he was an important influence in it.

Scholberg's championship of lost causes and his fights for the underdog sometimes put him at variance with his colleagues, and his intolerance of insincerity sometimes hurt more than he intended. To those who knew him intimately he was a kind-hearted, utterly unselfish and sympathetic man, with a boyish sense of humour. His laboratory staff were devoted to him. He leaves a widow and one married son.

Lieut.-Colonel Edwin Goodall writes: For twenty-one years, while I was medical superintendent of the Cardiff Mental Hospital and he part-time pathologist, we worked in close association. That research work, summarised annually in the hospital reports, was largely inspired and done by him. He steadily viewed the psychoses from the somatic standpoint, that of the physio-pathology of disease, and our work was undertaken in accordance with this standpoint which I shared. He grasped the need for the complete psychiatric clinic, a unit of the general hospital at university centres with medical schools, and we worked together to promote this conception, so elementary abroad, still unadopted here. Scholberg was a devoted student of medicine of the brilliant, unorthodox type, with a clear, quick, and critical mind. Under the ideal dispensation he would have been taken young, drafted into whole-time research, and left largely to his own devices. His eager, rapid mode of work, with running commentary and a sprinkling of Spanish expletives, what time an emotional cathartic seemed indicated, was caviar to the jaded. For him no trouble was too great which served to promote scientific medicine or was likely to help his colleagues.

DR. JITTA

Dr. N. M. Josephus Jitta, the honorary president of the permanent committee of the International Public Health Office, died on June 4. He had been the delegate for Holland on the committee from 1920 until early this year and in 1935 he succeeded Sir George Buchanan as president. His health had been failing for some time and when his term of office came to an end in October, 1938, he did not wish to stand again for the position of president, and Dr. M. T. Morgan was elected in his place.

Dr. Jitta had had a long and fruitful career as clinician and hygienist and as the administrative head of the health services of his country. He had held the post of president of the Council of Hygiene of the Netherlands since 1920 and had directed important researches on vaccination and postvaccinal encephalitis. He was the representative of the International Office of Public Health on the Health Organisation of the League of Nations for many years and he did much to coördinate the activities of the two bodies. He took a large part in the work preparatory to the revision of the International Sanitary Convention of 1926, especially in connexion with problems concerning the Suez Canal and the Mecca pilgrimage.

All who knew Dr. Jitta personally were struck by his kindly manner and by the sureness and subtlety of his judgment, and his long experience of international hygiene made his advice welcome to his colleagues.

INFECTIOUS DISEASE IN ENGLAND AND WALES

DURING THE WEEK ENDED SEPT. 21, 1940

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1538; whooping-cough, 1245; diphtheria, 1058; enteric fever, 68; measles (excluding rubella), 7435; pneumonia (primary or influenzal), 465; puerperal pyrexia, 123; cerebrospinal fever, 119; poliomyelitis, 38; polio-encephalitis, 2; encephalitis lethargica, 6; dysentery, 46; ophthalmia neonatorum, 68. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Sept. 20 was 1181, made up of: scarlet fever, 215; diphtheria, 185; measles, 408; whooping-cough, 30; enteritis, 30; chicken-pox, 36; erysipelas, 27; mumps, 4; poliomyelitis, 0; dysentery, 3; cerebrospinal fever, 16; puerperal sepsis, 21; enteric fevers, 35; german measles, 4; other diseases (non-infectious), 65; not yet diagnosed, 102.

Deaths.—In 126 great towns, including London, there was no death from smallpox, 1 (0) from enteric fever, 1 (0) from scarlet fever, 6 (0) from whooping-cough, 9 (2) from measles, 37 (1) from diphtheria, 45 (4) from diarrhœa and enteritis under 2 years, and 7 (1) from influenza. The figures in parentheses are those for London itself.

Plymouth reported 7 deaths from diphtheria, Manchester 3. Liverpool had 8 fatal cases of diarrhœa. There were 4 deaths from measles at Manchester. The fatal case of enteric fever was at Rochdale.

The number of stillbirths notified during the week was 227 (corresponding to a rate of 38 per thousand total births), including 25 in London.

Births, Marriages and Deaths

BIRTHS

BRAND.—On Oct. 27, at Eden Bridge, the wife of Surgeon Lieut.-Commander T. A. Brand, R.N.V.R.—a daughter.

MARRIAGES

EAST—THATCHER.—On Oct. 24, at Broadwater Church, Cecil John East, M.B., to Gwladys Elizabeth Griffyth Thatcher.

ODDIE—KESSLER.—On Oct. 21, at Ellesborough Church, Bucks, Ripley Oddie, B.M., Flying-Officer R.A.F.V.R., to Jeannette Anne Kessler.

DEATHS

FRANCIS.—On Oct. 13, at 32, Park Drive, Hastings, Alfred George Francis, O.B.E., M.B. Lond., F.R.C.S., F.S.A., in his 78th year.

FRIEND.—On Oct. 24, at Sidmouth, Devon, Herbert Edward Friend, M.R.C.S., formerly of London, aged 85.

HEWITT.—On Oct. 25, David Walker Hewitt, C.B., C.M.G., M.B. R.U.I., F.R.C.S., Surgeon Rear-Admiral, R.N. (retd.).

LEWIS.—On Oct. 23, Richard Crump Lewis, L.R.C.P.I., Lieut.-Colonel R.A.M.C. (retd.), of Grafton, Salcombe, S. Devon.

MAYO.—On Oct. 20, at Hove, Herbert Reginald Mayo, M.B. Camb., aged 66.

RAMSAY.—On Oct. 25, at Dutton, Longridge, near Preston, Jeffrey Ramsay, O.B.E., M.D. Lond., F.R.C.P.

SNELL.—In October, Ernest Hugh Snell, M.D., B.Sc. Lond., F.R.S.E., barrister-at-law, of Middle Temple, formerly medical officer of health for Coventry.

TURNBULL.—On Oct. 18, at Stert, Devizes, Robert Cyril Turnbull, M.D. Lond., late medical superintendent of Severalls Mental Hospital, Colchester, aged 63.

WYLER.—On Oct. 22, Edwin Joseph Wyler, M.C., M.D. Lond.

The National University of Ireland has awarded a travelling studentship in pathology to Dr. Francis Duff.

Notes, Comments and Abstracts

GROWTH OF EVACUATED CHILDREN

By J. E. Cheesman
ASSISTANT SCHOOL MEDICAL OFFICER, KENT COUNTY COUNCIL

In a group of 500 children evacuated from London to a rural reception area in Kent, in September, 1939, the standing heights and weights, excluding boots and outdoor clothing, were taken immediately and arranged according to age-groups. It was found that these children were on the whole slightly superior in height and weight to the general London standard. The proportion showing poor nutrition and physique was low, comparing favourably with the native children. They came from better-class schools in a south-east suburb and were by no means slum children. Subsequent development during 3 and 6 months sojourn with us are shown in figs. 1 and 2.

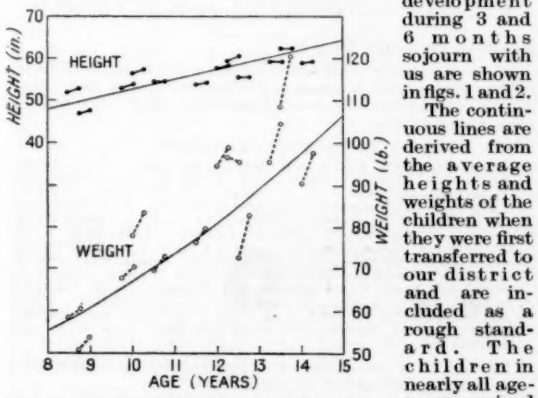

Fig. 1—Increase in height and weight in three months at different ages.

The continuous lines are derived from the average heights and weights of the children when they were first transferred to our district and are included as a rough standard. The children in nearly all age-groups gained in weight at a greater rate than would have been anticipated from the standard. This may be appreciated from the fact that the weight lines in the two graphs are not parallel to the standard but rise steeply away from it in most cases. This is evident throughout the different age-groups, as well as in groups of children who were, and remained, either below or above the standard for the whole series. It can be seen, too, that this accelerated increase in weight is not explained by an increase in height, which approximates much more closely to the standard than weight. The few exceptions do not discount the general upward trend. The data were collected at routine inspections, and the children were not specially selected.

The following general remarks are of interest, but causal relationships must not be taken for granted. The widespread impression among all who were watching these children is that their health and appearance have improved concurrently with their increase in weight. Weight above the average used to be associated, in R.A.F. personnel, with a sickness wastage below average.[1] There has been a falling off in the case-incidence of certain infectious diseases among children during the first four months of evacuation.[2] Weight rises more rapidly during the winter than the summer[3] but not to the extent shown by most of the children in this series. Weight tends to rise in school holidays and fall during school terms,[4] but with part-time education and the shift system in operation educational pressure has necessarily been relaxed. The graphs show at least that the children under survey increased in weight at an unusual rate while experiencing a change in home and school environment, and it can be assumed that the increase was due, not to season, growth in height or improvement in the standard of living but to other factors which are recognised in Scandinavia, where the wholesale evacuation of town children to the country and seaside during the summer months has long been a peaceful annual institution.

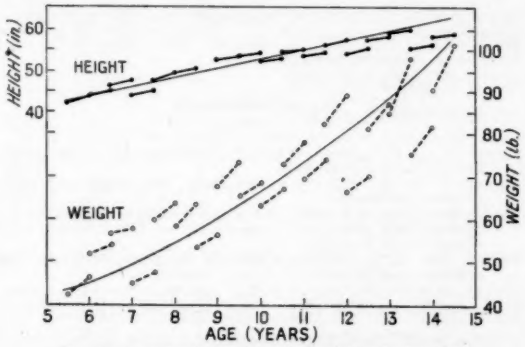

Fig. 2—Increase in height and weight in six months.

THE BLIND IN WAR-TIME

At the outbreak of war the National Institute for the Blind undertook to continue its work whatever happened. Its work has not, of course, diminished and with the progress of war it is likely to increase. The council, under the chairmanship of Captain Sir Beachcroft Towse, with the joint blind welfare committee of the County Councils Association and the Association of Municipal Corporations, have gained the approval of the Minister of Health for a national scheme to include men, women and children blinded as a result of hostilities. The Ministry has arranged to meet the whole cost of hospital treatment in such cases; the institute, the local societies and the local authorities will undertake their vocational training. Residential centres for this purpose will have to be set up throughout the country, and with a view to staffing them the institute has opened a register of war workers, paid or voluntary, for the blind. Hundreds have already enrolled, and the institute will supply enrolment forms on request.

The institute undertakes the care of the blind person at any stage in his life. The Sunshine Homes are residential nursery schools where blind young children are given early training in the meanings of sounds heard and things touched. At the Court Grange special school dull and backward blind children receive the care and encouragement their disabilities require. A holiday home for children—"Pirates Spring," near Dymchurch—normally receives school journey parties of blind children in the holidays, but since the war it has been placed at the disposal of the L.C.C., and had been used, up to the end of the first seven months of war, to house the pupils and staff of Linden Lodge school for blind boys. Chorleywood College for girls with little or no sight and Worcester College for the Blind can both claim academic successes in the past year. Many of the pupils take the school-certificate examination, others go on to the higher certificate; there has been one entrant to Westfield, one winner of the Barker scholarship at Queen's College, Oxford, and many entrants to the institute's school of massage. One of the old boys is a fellow of Balliol.

The Braille library of the institute is composed of 15,000 volumes and grows yearly as 150 voluntary Braille writers add to the list. If a blind student requires any book not in the library it is forthwith transcribed for him. At the beginning of the war the department responsible for the library took over, for the Government, the task of censoring all Braille letters, books and periodicals sent to foreign countries. During the year a new series of "Panda" books have been published in Braille. They are concise topical books, or fiction, and correspond to the familiar Penguins. They are bound on a Spirax wire coil, which makes it possible for the reader to open them out flat, and saves paper by allowing more Braille characters to the page. Paper saving has been taken seriously by the blind, and the twenty separate newspapers and magazines published before the war have been reduced to sixteen. The institute, however, puts in a plea for a special allowance of paper which means even more to the blind reader and writer than to the rest of us.

1. Treadgold, H. A. *Lancet*, 1934, 1, 1377.
2. Glover, J. A. *Proc. R. Soc. Med.* 1940.
3. Holt, E. The Scales, New York, 1924.
4. Allen, J. *Lancet*, 1937, 1, 674.

The blind masseurs and masseuses were among the first to volunteer for national service at the outbreak of war, and many of them enlisted in the Chartered Society's massage corps. During the year 16 graduates of the institute's massage school obtained hospital and clinical appointments, and five started in private practice. Many blind people every year are trained in secretarial work, piano tuning, basket work and handicrafts; blind musicians make use of Braille music; old people read the Moon embossed type, some are journalists, lecturers and teachers; some manage trading kiosks, which can be learned easily at any age, or listen to the "talking book," the special gramophone which reads aloud to them. The scope of the institute's work is limited only by the ingenuity of its council and the funds they are able to control. Contributions should be sent to the treasurer, National Institute for the Blind, 224, Great Portland Street, London, W.1.

MIDDLESEX PRESCRIPTIONS

IN August of this year there was a slight decrease in the number of prescriptions dispensed in Middlesex as compared with the number dispensed in August, 1939, the last month of peace. Figures considered at a meeting of the war emergency section of the Middlesex pharmaceutical committee on Oct. 23 showed that 221,896 prescriptions were dispensed in August, 1939, as against 221,749 in August, 1940; the insured persons had increased, however, from 862,289 to 868,816. In August last year 257 prescriptions were dispensed per 1000 insured persons, the corresponding figure in 1940 being 255 per 1000. It seems that as far as Middlesex is concerned there has been little change in the amount of medicine consumed per insured person since the outbreak of war. There has, however, been a sharp rise in the average cost of medicines per head. In August, 1939, the average cost per 1000 insured persons was £9 14*s.* 2*d.*, while the comparable figure for August, 1940, is £11 0*s.* 3*d.* There has been no change in the dispensing fees paid to chemists, the increased cost being entirely due to the rise in prices of ingredients. If the cost of ingredients continues to rise, the additional value of stock which a chemist will have to carry will be much greater and the additional capital involved will be appreciable; it may become necessary to ask for a reconsideration of terms to meet the changed situation.

NEW PREPARATIONS

BOOTS PURE DRUG CO. (Nottingham) announce that for local application in wound infections Sulphanilamide Powder (Boots) is supplied in cartons containing 10 packets of 15 g.

"WELLCOME" BRAND DELAY INSULIN, an insulin preparation with a prolonged blood-sugar lowering action, has been made available by Burroughs Wellcome & Co., London, in a strength of 40 international units per c.cm. An additional strength of 80 units per c.cm. will be available soon. The product is issued in boxes of five 5 c.cm. phials containing a solution of protamine insulin, with a phial of sodium phosphate buffer solution, which, when mixed with the protamine insulin solution, produces a freshly precipitated suspension ready for subcutaneous injection. The suspension is only stable for a limited period but the unmixed solutions will remain of full-unit value for eighteen months.

CORRIGENDUM.—In the article by J. F. Heggie and R. M. Heggie (*Lancet*, Sept. 28, 1940, p. 391) describing an antiseptic analgesic tannic-acid jelly for burns the formula for the glycerin-tragacanth base should read:

Pulv. tragacanth	.. ..	2·0%
Glycerin	.. ..	10·0%
Distilled water	.. ..	ad. 100

On Wednesday, Nov. 6, at 2.30 P.M., the sections of therapeutics and surgery of the ROYAL SOCIETY OF MEDICINE are holding a discussion at 1, Wimpole Street, London, W.1, on the treatment of burns. The openers will be Surgeon Rear-Admiral C. P. G. Wakeley, Wing-Commander Cecil Flemming, Mr. A. H. McIndoe, Prof. W. C. Wilson and Prof. L. J. Witts.

On Friday, Nov. 8, at 2.30 P.M. Dr. A. J. Ballantyne will deliver his presidential address to the section of ophthalmology. He will speak on the reflexes of the fundus oculi.

Medical News

University of Oxford

An examination for the Theodore Williams scholarship in pathology will be held in the Sir William Dunn School of Pathology on Nov. 10, at 2 P.M. The scholarship is open to any member of the university, whether man or woman, who on June 30 in the year of the award shall not have exceeded 26 years of age and shall have attended the course in general pathology and bacteriology in the Sir William Dunn School of Pathology either in the year of award or in the previous year. Those intending to present themselves for the examination should inform the professor of pathology before Nov. 6.

University of Cambridge

On Oct. 18 the following degrees were conferred by proxy:

M.D.—R. W. D. Turner.

M.B., B.Chir.—J. D. Kidd and B. L. F. Heydon.

Scottish Conjoint Board

At recent examinations of the board of the Royal Colleges of Physicians and Surgeons of Edinburgh, and the Royal Faculty of Physicians and Surgeons of Glasgow, the following were successful:—

L.R.C.P. & S.E., L.R.F.P.S.G.

Hiram Baddeley, M. C. Bell, Harold Bernstein, T. B. Binns, D. S. Bomson, Thomas Brittain, A. G. Buick, D. E. T. Donaldson, M. D. Evelyn, Leo Feld, A. J. Friedman, A. P. Govender, Abraham Greenberg, J. J. Greenwald, Emanuel Grossman, N. S. Hantman, M. E. Haut, I. F. K. Hughton, Benjamin Hurewitz, Joseph Israel, P. G. M. G. Jones, Sidney Katz, M. J. Kelly, H. H. Kirk, A. M. Kumaraswamy, Jerome Kupchan, Bertram Levy, D. J. Livingstone, Leslie London, Archibald McAllister, E. W. Magill, Elizabeth D. Mercer, R. C. Nirsimloo, George Novis, Agnes W. B. F. O'Gorman, Sidney Osroff, Frank Pomerantz, M. I. I. Rajah, C. E. K. Ratnam, J. A. Reid, Isidore Robins, Bernard Ross, W. L. Schiffman, Julius Siegel, M. N. Sholtzow, Philip Snell, A. I. Swiller, Helen E. Swiller, M. P. Taff, M. E. Vawda, W. A. White, Paul Wiesenfeld, and D. L. Ziselman.

The following graduates of recognised foreign universities have also been admitted licentiates:—

W. B. Ehrmann, Elemer Forrai, Eric Goldsmith, Anselm Horowitz, Richard Posner, I. E. Reichenfeld, and Marianne H. Weigert.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council of the college on Oct. 26, with Prof. W. Fletcher Shaw, the president, in the chair, the following were admitted in absentia to the membership:—

A. F. Anderson, Edinburgh; J. O. E. Apthorp, Cape Town; A. L. Deacon, London; W. T. Dingle, Canada; D. B. Fraser, London; G. S. Lester, Walsall; S. W. Liggett, London; Robin Murdoch, R.A.M.C.; F. J. P. O'Gorman, Sheffield; Coralie W. Rendle-Short, Bristol; I. E. J. Thomas, Tunbridge Wells; L. O. Watt, Canada, and Stanley Way, Newcastle.

Army Casualties

The following R.A.M.C. casualties are announced:—

Prisoner of War.—Lieutenant J. H. Bolton, M.D. Melb.; Major J. H. T. Challis, M.R.C.S.; Captain A. Crook; W.S. Captain E. R. Dansie, M.B. Lond.; Lieutenant A. R. Dearlove, M.B. Lond.; A/Major A. K. Gibson, M.B. Edin.; Lieutenant J. J. Kennedy; Major L. W. Lauste, F.R.C.S.; Lieutenant A. W. C. Mellor, M.D. Camb.; Lieutenant H. T. Tate, M.B. St. And. and Major W. E. Tucker, F.R.C.S.

Previously reported wounded and missing, now reported prisoner.—Major J. G. Lawson, M.B. Durh.

Previously reported missing, now reported prisoner of war.—Major G. W. Barber, M.R.C.S.; Captain P. T. Cooper, M.B. Camb.; Lieutenant P. A. Forsyth, M.R.C.S.; Lieutenant T. C. N. Gibbens, M.B. Camb.; Lieutenant I. Jacobson, M.B. Cape Town, and Lieutenant I. Schrire, M.B. Cape Town.

Appointments

CAIRNS, J. G., M.B. Glasg., D.P.H.: tuberculosis officer and senior asst. M.O. for Portsmouth.

CAMPBELL, R. M., M.R.C.S.: asst. M.O. (Maternity and Child Welfare) for Halifax.

GALLAGHER, E. J., M.B. Melb., F.R.C.S.I.: resident registrar to the fracture and orthopædic department of the Coventry and Warwickshire Hospital.

GHOSH, S. C., M.B. Lucknow: M.O. at the Cornwall Works Dispensary, Smethwick.

MILLER, MARY, M.B. Dubl., D.P.H.: asst. M.O. for Leigh, Lancs.

WILLIAMS, A. F., M.B. Manc.: R.S.O. at Manchester Northern Hospital.

WINTER, HARRY, M.D., L.M.S. Nfld. M.Bd.: R.S.O. at the Coventry and Warwickshire Hospital.